THE IRON TRADE REVIEW

VOLUME XXXIX | CLEVELAND, NOVEMBER 8, 1906 | NUMBER 45

ORE SELLING

PROCEEDS RAPIDLY AT ADVANCED QUOTATIONS.

Lower Guaranty of Iron Content—Foreign Pig Iron Still Coming In.—Great Records in Mills.

The principal event of the week has been the heavy buying of iron ore at an unexpectedly high price. Sales began about two weeks ago with the understanding that the advance was to be 75 cents on Bessemer grades and 50 cents on non-Bessemer, but it has developed that the guaranteed iron content has been so reduced as to make the actual prices an advance of 90 cents on Bessemer and 60 cents on non-Bessemer grades, the quotations being as follows. Old Range Bessemer $5.15, Mesabi Bessemer, $4.90, Old Range non-Bessemer, $4.30 and Mesabi non-Bessemer, $4.10. These prices are the highest in the history of the trade with the exception of old range Bessemer, for which $5.50 was asked in 1900. Although these prices are prevailing in the large majority of the sales made, there is absolutely no agreement among the sellers, and one or two interests expect to get from 15 cents to 25 cents higher for choice ores. The decision to lower the guaranteed iron content is significant as an acknowledgment of the fact which has been apparent for several years that the average iron content of Lake Superior ores is gradually decreasing. This increased cost of ore will mean an advance of $1.80 per ton in the cost of manufacturing Bessemer pig iron and $1.20 in other grades. In spite of the tremendous production anticipated for next year, there is a scarcity of Bessemer ores and the decision of the Carnegie Steel Co. to abandon its Bessemer plants at Duquesne simultaneously with the completion of new open-hearth capacity, indicates a tendency to get away from the use of plants demanding low phosphorus ores.

New Construction. Statistics compiled by correspondents in all parts of the country indicate an unprecedented building program of blast furnaces and open-hearth steel plants. Fifty-nine blast furnaces now building, recently completed or authorized will have an annual capacity of 6,558,000 tons, while 98 open-hearth plants will have a capacity of 2,740,000 tons. This new capacity exceeds that of the hitherto unsurpassed year of 1902. A large number of finishing mills are also being built.

Record Breaking. Although the continued importation of foreign pig iron has to some extent relieved the tense conditions in the American market, prices are still tending upward. Quotations vary greatly according to time of delivery. The pressure on the finishing mills is still strong, but structural plants in the Pittsburg district are now able to give prompt delivery. At Chicago the market for finished products is particularly strong. Light rails have advanced $1 a ton and cast iron pipe $2 a ton. The month of October was remarkable for record breaking in the mills.

ALL RECORDS SMASHED.

(Special Telegram.)

New York, Nov. 7.—October production U. S. Steel Corporation furnace products was 1,008,433 tons. The best previous record was in March, 1906, 999,103 tons. The production of ingots in Oct. was 1,282,750 tons; the best previous record, March, 1906, was 1,270,834 tons. Individual records broken by Carnegie Steel Co., 71; Illinois Steel Co., 14; National Tube Co., 12; American Steel & Wire Co., 7; American Sheet & Tin Plate Co., 15; American Bridge Co., 2; total, 121.

The Lackawanna Steel Co. will build a new billet mill, but has not yet decided on the type.

The Norwalk Steel & Iron Co., Norwalk, O., is installing charging apparatus to replace hand labor on its furnaces. Machinery is being supplied by the Wellman-Seaver-Morgan Co., Cleveland.

PRODUCTION RECORDS

BROKEN BY ILLINOIS STEEL CO. DURING OCTOBER.

Former Output of Pig Iron, Ingots, Open-Hearth Steel, and Finished Materials Exceeded.

(Special Telegram.)

Chicago, Nov. 7.—The Illinois Steel Co. broke all previous records during October in its production of pig iron, ingots, and open-hearth steel and in the operation of the blooming, structural, slabbing, and plate mills at the South Works, and in the production of bars at the Milwaukee Works.

The output of pig iron during October from all the company's furnaces was 120,754 tons. The best previous month was Sept., 1906, with 115,825 tons. The total output of ingots last month, all works, was 212,547 tons; the best previous record was 192,385 tons.

In the production of open-hearth steel, the best previous record for twenty-four hours' operation was made Jan. 30, 1906, when 2,137 tons were produced. An out-turn of 2,449 tons was made in the same number of hours Oct. 1. The best previous record for one week's output was made in the week ending Sept. 1, 1906, with 9,539 tons. For the week ending Oct. 6, 11,516 tons were made, and in the week ending Oct. 13, 12,433 tons were produced. August, 1906, held the best previous record for one month's output of open-hearth steel with 37,586 tons; October broke it by making 53,473 tons. The best record for an individual open-hearth furnace of the Illinois Steel Co. was also made last month when No. 17 furnace produced 5,001 tons.

Blooming Mill Records.

The best previous record for 12 hours' operation was made Sept. 29, 1906, when 770 tons were turned out. Oct. 9, 8,101 tons were produced. For twenty-four hours' operations, the best previous record was 1,420 tons, also made Sept. 29, 1906. Oct. 9, 1,532 tons were rolled. The best previous week's record was made in the week ending Sept. 29, 1906, when 7,646 tons were produced. For the week ending Oct. 13, 8,544 tons were produced. The month of September, 1906, held the best previous record of 27,240 tons. During October, the output was 31,134 tons.

(Continued on Page 15.)

THE WEEK IN IRON CENTERS.

PITTSBURG.

High Prices for Ore.—Record Breaking in the Finishing Mills.

Office of THE IRON TRADE REVIEW, 521 PARK BUILDING, Nov. 7.

The most important transaction of the week, as far as independent furnace interests are concerned, has been the fixing of minimum ore prices for the year of 1907, bringing with it a change in the iron guarantees. The outcome of the discussions of the ore men brought about a scale of prices which means to the furnace man an increase of 90c per ton on Bessemer grades and 60c on non-Bessemer grades, by establishing a base price of $4.75 for Mesabi Bessemer ores and $5 per ton for Old Range Bessemer, with a changed iron guarantee of 55 per cent in natural condition as against 56.70 per cent which prevailed in 1906. The non-Bessemer basis was made $4 on Mesabi and $4.20 on Old Range ores, the new iron guarantee on non-Bessemer being 51.50 per cent as against 52 per cent on Mesabi and 52.80 per cent on Old Range ores last season. This basis will establish the minimum price for furnace supplies for the season of 1907, but a number of influential sellers of ore are disposed to view the new arrangement as establishing a minimum only, there being many questions relating to structural qualities on some of the ores which establishes differential values on account of diversity in working qualities and furnace yield. It is probable that some of the better ores will bring from 15c to 25c per ton higher than the new minimum base.

October was a record breaker as far as output of finished material is concerned in this district and several world's records were made by the mills, notably the Edgar Thomson plant of the Carnegie Steel Co., which during the month turned out over 82,000 tons of standard section rails on No. 1 and No. 2 mills. At the same plant the eleven blast furnaces made 148,134 tons of steel making pig iron and of this tonnage four stacks made 82,301 tons. Other plants of the corporation also broke all previous records for production in blast furnace, open-hearth and Bessemer departments as well as finishing mills.

Prices of finished materials have remained remarkably steady in view of the high prices now being asked for the raw and semi-finished products. The advances of merchant pipe, and sheet and tin mill products, announced during the past two weeks, are the only finished lines in which higher prices are noted, outside of steel bars for which some mills are asking higher figures. It would not be at all surprising to see an advance in hoops and wire products during the coming week. Bar iron is very strong in this market and is showing a marked tendency toward higher prices. Under the heavy buying and the disposition of consumers to stock in anticipation of car shortages next month, coke prices are higher this week than last and the Frick Coke Co. is still buying, but there has been little offered to it.

Pig Iron.—There is really very little inquiry for prompt iron, practically all the large consumers having covered a long time ago, and what buying is being done now is by the smaller interests who were either fast asleep or had decided to take a chance on what was to come. The impression prevails that pig iron prices have about reached the top and that the importations now being made will have a tendency to steady the market and act as a balance without depression. Foreign foundry iron is now offered for January and February delivery in Pittsburg, a grade equal to high silicon No. 1 soft southern at $26.35, delivered Pittsburg and another grade equal to No. 2 Scotch northern at $25.10, Pittsburg. These are Glengarnock brands. Imported Carnbroe No. 1, equal to No. 1 soft southern is offered at $25.60, Pittsburg and the same brand, No. 3, equal to No. 2 soft southern, is offered at $24.85, Pittsburg. No tonnages available are mentioned with these offers, and all orders are taken subject to cable confirmation. Producers of domestic iron do not seriously consider the probability of this foreign iron making serious inroads, as foreign prices are advancing, according to information received, almost as rapidly as they are in this country.

Bessemer pig iron is still quoted $21 to $22, valley for first half delivery and basic the same. There have been no sales of note during the week. One 500 ton lot of northern No. 2 foundry has been sold at $21 valley furnace for first half delivery and the same interest sold 1,000 tons of gray forge at $19.75, furnace, also for first half delivery. Southern No. 2 is quoted $20 to $21, Birmingham for spot delivery and $19 to $20 for first half of next year. On first half delivery we quote:

Bessemer Valley	21.00 to 22.00
Bessemer, Pittsburg	21.85 to 22.85
No. 1 Foundry, Pittsburg	22.35 to 22.60
No. 2 Foundry, Pittsburg	21.85 to 22.10
Gray Forge, Pittsburg	20.60 to 20.85
Basic, Valley	21.00 to 22.00
Basic, Pittsburg	21.85 to 22.85

Steel.—Despite the heavy productions of finishing mills during the past month, the supply of semi-finished steel has somewhat improved and a sale of Bessemer billets 4 x 4 is reported at $28, Pittsburg. The easing up to some extent may probably be accounted for by the fact that several of the open-hearth plants of independent consumers are getting into operation and these consumers are no longer dependent for their requirements from the usual sources. We quote soft Bessemer billets, 4 x 4 at $28 to $29 and open-hearth $29 to $30, with the usual differential for sheet and tin bars.

Skelp.—Quotations at this time are nominal, as there is very little offered. Specifications are very heavy against old contracts made early in the year and which continue for some time to come. We quote nominally as follows: Bessemer grooved, 1.65c to 1.70c; sheared, 1.70c to 1.75c. Open-hearth, grooved, 1.75 to 1.80c, sheared 1.80c to 1.85c. Iron skelp, 1.80c to 1.85c.

Muck Bar. — The leading producer of muck bar has been out of the market for several months. There has been some inquiry, but very little muck bar is offered. We quote a nominal price of $34 on all pig metal bar and $30 to $31 on part scrap bar.

Hoops and Bands.—New business and specifications against old contracts are both heavy and great pressure is being made to get deliveries, mills being behind and crowded on shipments. We continue to quote as follows:

Hoops, in carload lots, 1.90c; in less than carload lots, 2c; bands, 1.50c base, half extras as per standard steel card. Prices f. o. b. Pittsburg.

Plates.—The plate situation is very strong and mills are booked to capacity for from three to five months ahead, the steel car companies and lake ship builders being especially persistent in pressing for deliveries. Mills are about two months behind in their shipments and the scarcity of steel, while it is not so great now as it was a few weeks ago, is still a big factor. Prices remain unchanged and we continue to quote as follows:

Tank plate ¼-inch thick, 6¼ to 100

inches, 1.60c f. o. b. mill, Pittsburg. Light plate schedule, No. 10, 1.70c; Nos. 11-12, 1.75c; Nos. 13-14, 1.80c; Nos. 15-16, 1.90c. Extras on the regular plate schedule are as follows per 100 pounds: boiler and flange steel plates, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches excepting straight taper plates, varying not more than four inches in width at ends, narrowest end not being less than 30 inches, 0.10c; complete circles, 0.20c. Plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1.00c. Gauges under ¼-inch to and including 3-16-inch plates on thin edges, 0.10c; under 3-16 inch to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—The business now on the books of the leading interest is larger than at any previous time in the history of the company, and specifications have been extremely heavy. There has been considerable new business at the advanced prices, but this has been comparatively small and is, for the most part, supplementary orders from consumers who, earlier in the year, thought they had covered for requirements but now find the demand so great and prospects so good that they have been compelled to place additional business. This supplementary business in some instances has exceeded the original orders. The American Sheet & Tin Plate Co. has authorized the installation of eight more hot mills at the Vandergrift plant, making a total of 37, and two more hot mills will be installed at the Pennsylvania works and one at the Pittsburg plant. Deliveries have not improved, but they are not getting worse, despite the difficulties being encountered as a result of the car shortage. No business is being sought into the second quarter of next year, but where customers insist upon placing it, orders are placed on the books. In these instances, while there is no guarantee against a lower market in the contracts, there is an implied understanding that the customer will be taken care of under conditions governing sales to the large buyers. We quote:

Black steel sheets, one pass, cold rolled: Nos. 11-12, 2.20c; Nos. 13-14, 2.25c; Nos. 15-16, 2.30c; Nos. 17-21, 2.35c; Nos. 22-24, 2.40c; Nos. 25-26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 29, 2.75c; No. 30, 2.85c; Galvanized, Nos. 10-11, 2.55c; Nos. 12-14, 2.65c; Nos. 15-16, 2.75c; Nos. 17-21, 2.90c; Nos. 22-24, 3.05c; Nos. 25-26, 3.25c; No. 27, 3.45c; No. 28, 3.65c; No. 29, 3.90c; No. 30, 4.15c. Corrugated roofing, $1.85 per square for No. 28 painted, 2½ inch corrugation and $3.15 per square No. 26 galvanized, 2½ inch corrugation. Blue annealed sheets, No. 10 and heavier 1.80c; Nos. 11-12, 1.85c; Nos. 13-14, 1.90c; Nos. 15-16, 2c.

Rails and Track Material.—The past week has been good on inquiries and fair on the amount of business booked, amounting to about 20,000 tons of standard sections and 1,500 tons of light rails, for local mills. The Edgar Thomson Nos. 1 and 2 mills broke all previous records in October by rolling over 84,000 tons of standard sections. Indications at the present time are that about six weeks' rollings of standard rails will have to be carried over into next year. We quote as follows.

Fifty pounds and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; light rails, 16 pounds, $32; 20 pounds, $33; 25 pounds to 45 pounds, $31 to $32; angle bars for standard sections, 1.50c; spikes, $2.50 to $2.75 for forward deliveries.

Tin Plate.—New business for the time being is practically cleaned up, but specifications continue good and with a slightly improved supply of semi-finished steel, progress is being made in the way of quicker deliveries although this condition has not been in vogue long enough to materially change the outlook from the standpoint of the promise sheet. As in the case of sheets, some business is being taken into the second quarter of next year, but these cases are comparatively isolated and this has not become general, nor is business being solicited for this delivery. We quote as follows:

Coke tin plates, 100-pound basis, 14 x 20, $3.90 f. o. b. mill, Pittsburg district. Terms, 30 days, less two per cent for cash in 10 days.

Merchant Bars.—The market in both iron and steel bars is in an exceedingly healthy condition and on steel bars specifications are exceeding mill shipments. The Carnegie Steel Co. and Jones & Laughlin Steel Co., continue to quote the 1.50c Pittsburg base on steel bars, while other interests are quoting 1.60c for last quarter delivery and for the first six months of next year. Bar iron has been in very strong demand, and there have been one or two heavy sales. Republic and Lockhart Iron & Steel companies are quoting 1.75c Pittsburg, and where last week western mills were quoting 1.60c for western shipment, they are now quoting 1.65c to 1.70c and some business has been done at these figures. We quote:

Common iron bars, 1.75c Pittsburg in carload lots, 1.80c in less than carloads; Bessemer steel bars, 1.50c; plow and cultivator, 1.50c net; channels, angles, zees and tees, under three inches, 1.60c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds, of a size, 0.30c advance.

Wire and Wire Nails. — All mills are well booked for the contract period of 60 days and there is a remarkable increase both in inquiry and actual business, coming in from all sources. Quoted prices are being very firmly maintained and business at lower than the card is being turned down. One mill has advanced its price to 2c on wire nails and a general advance is expected within the next ten days or two weeks. We continue to quote as follows:

Wire nails, jobbers' carload lots, $1.85; retailers' carload lots, $1.90, and less than carload lots, $2; painted barb wire, $2 for jobbers in carloads; retailers in carloads, $2.05, and less than carloads, $2.15, with 30c for galvanizing; plain wire, $1.70 to jobbers and $1.75 by carload.

Merchant Steel.—There has been no change in conditions, a heavy demand for shafting and machinery steel continuing and a fair amount of new business being taken. The demand for shafting is particularly strong and there are instances where premiums have been obtained, $4 to $5 in advance of quoted prices for prompt deliveries. We quote:

Cold rolled and ground shafting, 50 per cent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.70c to 1.80c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.05c to 2.10c. The price of planished and machine straightened tire is 1.70c base half extras as below. Iron finished tire up to 1½ inch by ½ inch, 1.65c base half extra tire list. Iron finished tire 1½ inch by ½ inch and over to be sold on regular bar basis of 1.50c base; half extra steel card.

Ferro - Managanese. — For both prompt and future deliveries $80 to $82.50 is quoted on the good grades of imported ferro-manganese. On 50 per cent ferro-silicon $106 to $108 is quoted on all deliveries and $34 on domestic and $35.50 on imported 12 per cent.

Structural Material.—While there is a little doing all the time in the structural trade, conditions have eased off to a considerable extent and mills are pretty well caught up, are looking

for business, and are in shape to make good deliveries on the full range of rollings. We continue to quote:

Beams and channels, 15-inch, and under, 1.70c; over 15 in., 1.80c; zees, 1.70c; tees, 1.75c; angles from three to six inches, inclusive, 1.70c; over six inches, 1.80c; universal and sheared plates, 6¼ inches and wider, 1.60c base.

Merchant Pipe.—There has been no particularly large business placed during the week under review, but the volume of small orders has been gratifying. Prices are very firm and the recent advance is being maintained and the advance did not to any appreciable extent discourage buying and specifications are heavy, buyers being insistent on deliveries, which are going behind. We quote the following official discounts for consumers, jobbers' discounts being 70 basing, base sizes, and 5:

	Steel		Iron	
	Black	Galv.	Black	Galv
⅛ to ¼ inch	69	53	65.5	49.5
⅜ inch	71	57	65.5	49.5
½ inch	73	61	68.5	57.5
¾ to 6 inches	77	67	73.5	63.5
7 to 12 inches	72	57	69	54
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch	62	50	58.5	46.5
½ to 4 inches	69	57	65.5	53.5
4½ to 8 inches	65	53	61.5	48.5
Double extra strong plain ends, ⅛ to 8 inches	58	47	53.5	42.5

Boiler Tubes.—There has been a stronger demand for merchant boiler tubes and prices are firm. Locomotive boiler tubes continue to be in big demand. We quote as follows:

Boiler tubes.	Steel	Iron
1 to 1¼ inches	50	45
1½ to 2¼ inches	62	45
2½ inches	64	50
2¾ to 5 inches	70	57
6 to 13 inches	62	45

Less than carloads two points less.
2½ inches and smaller, over 18 feet, 10 per cent. net, extra.
2¾ inches and larger, over 22 feet, 10 per cent. net, extra.

Old Material.—There has been but little movement in scrap and several promising negotiations have fallen through on account of inability of broker and consumer to agree on prices. Dealers are quoting prices higher than consumers care to pay and the market rests in that condition. We quote: Heavy melting scrap, $17 to $17.50; rerolling rails, $19 to $19.50; bundled sheet scrap, $14.75 to $15.75; iron car axles, $29 to $30; old car wheels, $20.50 to $21; old iron rails, $24 to $25; No. 1 wrought scrap, $19.50 to $19.75; low phosphorus scrap, $22 to $22.50; machine shop turnings, $13.25 to $13.50; axle turnings, $13.50 to $13.75; cast borings, $11.50 to $12; No. 1 cast scrap, $18 to $18.50.

Coke.—There has been considerable inquiry for spot coke and the inference is that furnaces are storing it up on account of the probable greater car shortage expected next month with colder weather and snow. There are still quite a few furnaces that have not covered for their full requirements and producers have no difficulty in disposing of all the coke they can get, at prices quoted. The Frick Coke Co. is still in the market for coke and is offering better than $3 for the whole of next year, but very little is offered them at these figures. We quote the good grades of Connellsville furnace coke for spot shipment $3.20 to $3.30, ovens, and for the first six months of next year, $3.25 to $3.35. For the 12 months of next year $3.10 to $3.25 is quoted. On standard 72-hour Connellsville foundry coke we quote $3.85 to $4 on contract and $4 for shipment during the remainder of this year.

CHICAGO.

Much Excitement in Pig Iron.—All Lines Stronger.

Office of THE IRON TRADE REVIEW.
1362 MONADNOCK BLOCK, Oct. 30.

Greater strength prevails in all lines. Light rails have advanced $1 a ton; cast iron pipe, $2 a ton; scrap from $1 to $2 a ton and pig iron an average of $1 a ton. Hoops are expected to go up in a few days despite the decision not to enforce the advance which was announced to take effect Nov. 1. Boiler tubes are also slated for an early advance according to rumors in authoritative quarters, and demand for them is increasing actively. Spikes, nuts and bolts are so scarce that premiums up to $5 a ton are offered for early delivery. Prompt shipments of steel bars also command attractive premiums, and iron bars are stiffening under the increasing strength of raw material.

Of chief interest, however, is pig iron, which by its series of rapid upward movements has thrown the local market into a maelstrom of excitement. Spot iron is now selling in Chicago at $25.90 for southern No. 2 and $25.50 to $26.50 for northern No. 2. The latter is much harder to obtain. The car shortage in the south is increasing in severity and the contract deliveries are falling further behind. Forward requirements are receiving scant attention, and inquiry for other than immediate needs is very light. Specifications for finished material continue extremely heavy.

Light rolled shapes are in the greatest demand and for such materials as iron and steel bars, agricultural shapes, wire products, plates and sheets, mills are overwhelmed with business.

Record-breaking operations are being made by local mills and furnaces,

Pig Iron.—All kinds continue active and demand is only limited by supply. The market is very erratic and the numerous cross currents make it difficult to convey an accurate conception of conditions. There are five schedules of prices in vogue, one for spot shipment, another for first quarter deliveries, a third for second quarter, a fourth for the entire first half, and the fifth for last half deliveries, of which quite a tonnage has been sold. No two selling interests have the same schedule for any particular delivery, each transaction being a law unto itself, and every seller being governed in naming prices or closing sales by the conditions peculiar to his own furnace. Prices that are the maximum today are the minimum tomorrow, so rapidly are values changing. Iron for any delivery between now and April 1 is so very scarce that trading has resolved itself into a question of how much the buyer will stand. His exigencies determine the basis. Nothing for spot delivery is sold in this market unless the car is on track or en route while for any delivery in the future the furnace must first be consulted before the order is accepted. Only one Birmingham interest is offering iron for the first quarter, for which it is asking $20 to $21. Spot iron commands $22, Birmingham, for southern No. 2, and $25.50 to $26.50, Chicago, is asked for northern No. 2. For second quarter, southern No. 2 is held at $18.50 Birmingham, while for the entire first half the price today is $19 to $19.50 Birmingham. For the first time in the present upward movement, foreign iron is being offered in the local market. Several cars of a Middlesboro (Eng.) low-phosphorus metal are being offered here at $28, Chicago. All grades of northern iron for any delivery are extremely scarce, first quarter shipments being particularly hard to obtain. Lake Superior charcoal and malleable Bessemer have advanced $2 a ton, being now quoted at $25 for spot and $24.50 for the first half. High silvery irons are in urgent demand as a result of the increasing use of low grade metal and scrap. Four per cent silicon is held at $23.50, Birmingham, and each additional point $1 a ton higher.

Jackson county silveries, eight to ten per cent, have also advanced, the minimum quotation today being $29.80, Chicago. Ohio strong softeners are also $2 a ton higher, No. 1 grade being held at $25.30 Chicago. Our quotations in the following column are only representative: They doubtless will have changed before this issue is off

the press. The higher prices are asked for the first quarter.

Lake Superior charcoal	$24.50 to 25.00
Northern Foundry No. 1	23.50 to 24.00
Northern Foundry No. 2	23.00 to 23.50
Northern Foundry No. 3	22.50 to 23.00
Northern Scotch Foundry	23.50 to 24.00
Ohio Strong Softeners No. 1	25.30 to 25.80
Ohio Strong Softeners No. 2	24.80 to 25.30
Southern Foundry No. 1	22.90 to 24.40
Southern Foundry No. 2	22.40 to 23.90
Southern Foundry No. 3	21.90 to 23.40
Southern Foundry No. 4	21.40 to 22.90
Southern No. 1 Soft	22.90 to 24.40
Southern No. 2 Soft	22.40 to 23.90
Southern Gray Forge	21.90 to 23.40
Southern Mottled	21.40 to 22.90
Southern Silveries (4 per cent to 6 per cent Silicon	27.40 to 29.40
Jackson Co. Silveries, 8 to 10 per cent Silicon	30.30 to 31.30
Malleable Bessemer	24.50 to 25.00

Billets.—The shortage of crude steel in the west remains very acute. The only conspicuous transaction this week was the sale of 6,000 tons of axle billets to a local fabricating shop for deliveries extending through the first half of 1907, the price being $35 Chicago. All other sales were for odd lots at various prices and for such deliveries as could be obtained. Nearby shipments are especially hard to secure and stiff prices are offered for deliveries this year. Last week the Steel Corporation had to shut down its wire mill at Donora, Pa., for two days because of a shortage in rods. Wire rods are very scarce and independent makers not fully protected are having great difficulty in supplying their requirements. Bessemer and open-hearth rods are quoted $34 and $35 Pittsburg respectively.

Iron and Steel Bars.—There is little change in either product in the local market. Specifications and new tonnage for steel bars are very heavy. The Illinois Steel Co. has tonnage on its books enough to operate its plants a full year if not another order is taken, while specifications in hand approximate three or four months' output. Where it is possible, many consumers have requested that bar iron be diverted on their contracts in place of steel, because of the better deliveries that can be given on the former product. The strength and high prices of bar iron in the east are not reflected in the local market; 1.55c Pittsburg is the best price that can be obtained here. The decision not to advance hoops is regarded as only a temporary postponement, and a positive announcement is expected in a few days. We quote carload lots, mill shipments, as follows:

Bar iron 1.71½c, soft steel bars and bands, 1.66½c, half extras; soft steel angles, less than 3 x 3, 1.76½c; hoops, 2.06½c base, full extras; old rail stock, 1.65½c. We quote bar iron from stock, 2.20c, full extras; soft steel rounds and squares, 3 inches and larger, $2 per 100 pounds base; flats, 2 inches to 4 inches by 1⅛ inch and larger, $2 per 100 pounds base; 4½ inches x 5 inches and 6 inches x 5-16 inch and thicker, $2 per 100 pounds base; all ovals, half rounds, $2 per 100 pounds base; steel bands, $1.85 to $1.95 half extras; soft steel hoops, $2.30 to $2.40 full extras. Other sizes not mentioned above, $2.00 per 100 pounds base plus half extras.

Structural Steel.—Numerous small orders for structural steel are reported by fabricators, the largest being for 2,500 tons for new buildings for the Atlantic Portland Cement Co., Nazareth, Pa., which was let to the American Bridge Co. Figures are now being taken for the erection of the new Sherman hotel in Chicago, the steel requirements of which will reach 7,000 tons. Mills are still operating close to order books and can give immediate rollings on new business. It is felt that there will be little improvement in structural steel, however, until prices are readjusted on a lower basis. We quote as follows:

Beams and channels, 3 to 15 inches inclusive, 1.70c Pittsburg. For extras see Pittsburg report. Freight rate from that city to Chicago is 16½c per 100 pounds. Quotations from store are as follows.

All angles, three inches and larger, including six inches, $2.05 to $2.10 per 100 pounds; angles over six inches, $2.15 per 100 pounds base; beams, three inches to 15 inches, inclusive, $2.05 to $2.10 per 100 pounds base; channels, three inches and larger, $2.05 per 100 pounds base.

Sheets.—The last advance in sheets has resulted in a curtailment of new tonnage. Specifications, however, show no diminution. The new schedule is firmly maintained

We quote as follows: Black sheets, Nos. 8, 9 and 10, 1.85c Pittsburg; No. 28 gauge, 2.60c Pittsburg. Galvanized sheets No. 28 gauge 3.65c Pittsburg. Freight to Chicago 16½c per 100 pounds. Jobbers' prices on less than carload lots from store are as follows: Black sheets, No. 10, 2.20c to 2.30c; No. 12, 2.25c to 2.35c; No. 14, 2.30c to 2.40c; No. 16, 2.40c to 2.50c; Nos. 18-20, 2.70c to 2.80c; Nos. 22-24, 2.75c to 2.85c; No. 26, 2.80c to 2.90c; No. 27, 2.85c to 2.95c; No. 28, 2.95c to 3.05c; No. 30, 3.35c. Galvanized sheets, Nos. 10 to 20, 3.25c to 3.35c; Nos. 22 and 24, 3.40c to 3.45c; No. 26, 3.60c to 3.70c; No. 27, 3.80c to 3.90c; No. 28, 4c to 4.10c; No. 30, 5.20c to 5.30c.

Plates.—Demand for sheared plates is good. Specifications are crowding mills to the utmost of their capacity. Deliveries are slow, from ten to twelve weeks being required on new tonnage. We quote as follows:

Tank steel, ¼-inch and heavier, up to 100 inches wide, 1.60c Pittsburg base. For extras see Pittsburg report. Freight rate to Chicago is 16½c per 100 pounds.

Jobbers' prices for shipment from local stocks are as follows: Tank steel ¼ inch and heavier, up to 72 inches wide, 2c to 2.10c; 72 inches up to 96 inches wide, 2.10c to 2.20c; 3-16 inch up to and including 60 inches wide, 2.10c to 2.20c; 3-16 inch, 72 inches wide, 2.35c to 2.45c; No. 8, up to 60 inches wide, 2.15c to 2.25c; flange steel, 25c extra; heads, 25c extra.

Rails and Track Supplies.—Light rails have been advanced $1.00 a ton. Track supplies are firmer and are commanding premiums for early deliveries. Tonnage for heavy sections continues light, the only inquiry pending being for 15,000 tons from a northwestern road. Demand for light rails and track supplies is very heavy, and manufacturers are sold ahead for several months. We quote as follows: Bessemer rails, $28; open-hearth rails, $29; light rails, Bessemer, 30 to 45-pound sections, $32; 25-pound, $33; 20-pound, $34; 16-pound, $35; 12-pound, $36, and lighter sections down to 8-pound, $42.50, all f. o. b. mill. Track supplies vary in price according to quantity and delivery. Angle bars in large lots are quoted 1.50c to 1.75c; for smaller quantities, 2.25c to 2.75c; spikes, large lots, 2.10c to 2.25c; for smaller quantities, 2.50c; bolts, large lots, 2.65c to 2.75c; smaller lots, 2.85c with square nuts, and 3c with hexagon nuts.

Cast Iron Pipe.—The increasing cost of pig iron has necessitated an advance in the finished product, and prices have this week been raised $2 a ton. New tonnage has fallen off as a result of the high prices now prevailing, and many municipalities and gas companies which were brewing on round lots have postponed their purchases to a later date. The Northern Pacific, which was in the market for 2,500 tons, has contracted for only 1,000 tons for this reason. We have revised our prices, and quote as follows: Four-inch water pipe, $36; six, eight, ten and 12-inch, $34.50; larger sizes, $34; gas pipe, $1 a ton higher.

Merchant Pipe.—No change is noted in the local situation. New tonnage is good and specifications are coming in freely. Prices are firmly maintained but without change. We quote Chicago discounts, in car lots, as follows: ¾ to six-inch black steel pipe, 77.35;

galvanized, 67.35. From store in small lots, Chicago jobbers quote 74½ to 75 per cent discount on the base sizes.

Boiler Tubes.—In anticipation of an advance in prices, which is rumored, new tonnage is increasing in a gratifying manner. Jobbers are specifying freely and placing large stocks in storage. We quote as follows: 2¾ to five inches, steel, 68.35; iron, 55.35; seamless, 2¾ to 4½, 50.85. Less than carload lots from store, base sizes, are 60 off for steel; 47½ for iron and 42½ for seamless tubes.

Wire Products.—There is no cessation in the demand for all wire materials. Deliveries are very slow, the scarcity of rods and the shortage in cars seriously handicapping manufacturers in meeting their contract obligations. Last week, the Donora, Pa. plant of the American Steel & Wire Co. was shut down for two days because of a failure in the rod supply. Other mills of the Steel Corporation are also running light for the same reason. Prices are without change but firmly maintained. We quote as follows.

Wire nails, $2; painted barbed wire, $2.15; galvanized barbed wire, $2.45; smooth annealed wire, $1.85; smooth galvanized wire, $2.15; polished staples, $2.15; galvanized staples, $2.40. Carload lots to retailers, five cents higher; less than carload lots, 15 cents higher.

Coke.—Coke is very firm in the local market. Standard 72-hour Connellsville brands are quoted at $4 ovens, and furnace coke from $3 to $3.25. Current demand is entirely confined to "filling-in" lots, for which prompt shipment is desired. Solvay coke is held at $6.40 to $6.65 Chicago, according to delivery.

Old Material.—Within the last ten days, scrap has advanced from $1.50 to $2.50 a ton. Demand is very active, the principal sale of the week being 3,000 tons of heavy cast scrap, which was sold at $17.50 Chicago. Dealers are bidding actively for the railroad tonnage offered, which this week is very large. The following lists are now being figured upon: A. T. & S. F., 2,000 tons; Baltimore & Ohio, 5,500 tons; Evansville & Terre Haute, 200 tons; Chicago & Eastern Illinois, 200 tons; Rock Island, 700 tons, and Grand Trunk, 600 tons. We have revised our prices, gross tons being given in the first paragraph:

Old Steel Rails (4 feet and over)	$20.50 to 21.00
Old Steel Rails (less than 4 feet)	19.50 to 20.00
Old Car Wheels	21.50 to 22.00
Old Iron Rails	28.00 to 28.50
Relaying Rails, subject to inspection	29.00 to 30.00
Frogs, Switches and Guards	18.50 to 19.00
Heavy Melting Steel	17.50 to 18.00
Mixed Country Steel	15.00 to 15.50

We quote net tons, as follows:

No. 1 R. R. Wrought	$18.00 to 18.50
No. 2 R. R. Wrought	17.00 to 17.50
Shafting	19.00 to 19.50
Dealers' Forge No. 1	13.50 to 14.00
Wrought Pipe and Flues	12.75 to 13.25
No. 1 Cast, 150 pounds and less	17.50 to 18.00
No. 1 Mill	10.50 to 11.00
Mixed Busheling (No. 1 & No. 2)	13.50 to 14.00
Country Sheet	9.00 to 9.50
No. 1 Boilers Cut	12.50 to 13.00
Boiler Punchings	16.00 to 16.50
Iron Car Axles	26.50 to 27.00
Steel Car Axles	23.00 to 23.50
Iron Axle Turnings	11.00 to 11.50
Cast Borings	9.00 to 9.50
Mixed Borings, etc	9.00 to 9.50
Machine Shop Turnings	11.00 to 11.50
Railroad Malleable	16.00 to 16.50
Agricultural Malleable	15.00 to 15.50
Stove Plate and Light Cast Scrap	13.50 to 14.00
Old Iron Splice Bars	22.00 to 22.50

CLEVELAND.

Ore Selling Rapidly at Considerably Higher Prices.—New Guaranty.

Office of THE IRON TRADE REVIEW, BROWNING BUILDING, Nov. 7.

Iron Ore.—The week has seen the beginning of the general ore-buying movement, which is certain to be extremely brief and active. Some scattered sales have been made during the past fortnight, chiefly by one mining interest, but the formal opening of the season came with the beginning of the present week, and already immense tonnages have been disposed of. The advance repeatedly predicted in these columns, 75 cents on Bessemer and 50 cents on non-Bessemer, is being generally secured. A factor of perhaps greater significance, however, has been instilled into the situation through the lowering of the basic guarantee of iron. On both Old Range and Mesabi Bessemer the natural iron content is reduced from 56.70 to 55.00 per cent and on both Old Range and Mesabi non-Bessemer the reduction is from 52.80 to 51.50 per cent. On this new basing schedule, prices for the 1907 season are as follows:

Old Range Bessemer	$5.00
Mesabi Bessemer	4.75
Old Range non-Bessemer	4.20
Mesabi non-Bessemer	4.00

For comparison in the following table with the prices obtaining in recent years, however, the 1907 rates are figured on the iron content heretofore maintained, and not the reduced base, thus showing that the actual advance has been practically 90 cents on Bessemer and 60 cents on non-Bessemer:

Year.	O.R.B.	Mes.B.	O. R. N-B.	M.N-B
1900	5.50	4.50	4.25	4.00
1901	4.25	3.25	3.00	2.75
1902	4.25	3.25	3.25	2.75
1903	4.50	4.00	3.60	3.20
1904	3.25	3.00	2.75	2.50
1905	3.75	3.50	3.20	3.00
1906	4.25	4.00	3.70	3.50
1907	5.15	4.90	4.30	4.10

It has been generally admitted for some time that practically the entire supply of the more desirable Bessemer ores was under reserve. This, taken in connection with the heavy production, present and prospective, of other irons, makes it certain that this buying season, although the earliest on record, will also prove one of the shortest. Already certain interests are well sold out; before Thanksgiving, it is predicted, there will be no more ore available.

The early opening of the movement was brought about by continued pressure from furnace interests, coupled with a willingness on the part of certain mining concerns to sell. Producers generally were opposed to any negotiations with the ore-buyer until after the close of the present navigation season, or at least until after Dec. 1, which was the opening date a year ago. The forcing of the issue called for unexpected and hasty estimates of the probable ore output for next year and embarrassing inaccuracies are certain to develop. Additional perplexities are thus thrust upon the shipper just at the time he is bending every effort to make the movement of the closing weeks of navigation as heavy as possible. On the other hand, the furnaceman now knows what he can count upon as the cost of his ore for the year beginning with May next, and has that uncertainty out of the way.

The figures of October shipments from upper lake ports have now been compiled and show an unexpectedly heavy movement, the 5,000,000 mark having been exceeded for the fifth consecutive month. Favorable conditions for the remainder of the season means a total movement of about 37,500,000 tons. Duluth has gained heavily. By ports shipments were as follows:

	Oct. 1905	Per cent of Total	Oct. 1906	Per cent of Total
Escanaba	620,567	14.58	697,068	13.77
Marquette	371,376	8.73	363,481	7.18
Ashland	447,580	10.51	413,029	8.16
Superior	707,029	16.62	904,571	17.87
Duluth	1,108,598	26.04	1,620,828	32.01
Two Harbors	1,001,259	23.52	1,063,817	21.01
Totals	4,257,009	100.00	5,062,794	100.00

	To Nov. 1 1905	Per cent of Total	To Nov. 1 1906	Per cent of Total
Escanaba	4,545,922	15.29	4,967,360	14 94
Marquette	2,631,210	8 84	2,509,286	7 55
Ashland	3,033,774	10.21	3,049,054	9.17
Superior	4,574,407	15.39	5,352,745	16.11
Duluth	7,895,976	26.56	9,955,216	29.96
Two Harbors	7,049,326	23.71	7,405,174	22.27
Totals	29,730,615	100.00	33,238,835	100.00

Pig Iron.—There is some little spot iron to be had on the basis of $24.00, valley, for No. 2 foundry, and odd lots of "off" and special irons are selling readily at any price the furnace sees fit to ask. Furnaces are generally out of the market for both first and second quarters and where any iron

is obtainable, each sale sets its own price, making accurate quotations extremely difficult. The usual run of requests for anticipated deliveries continues and there will doubtless be considerable suffering on the part of consumers before the end of the year. This, however, will not be so widespread as has been generally intimated. For first half delivery we quote nominally, f. o. b. Cleveland, as follows:

Bessemer	$21.50 to 22.50
No. 1 Foundry	21.00 to 22.00
No. 2 Foundry	20.50 to 21.50
No. 3 Foundry	20.00 to 21.00
No. 2 Southern	21.00 to 22.00
Gray Forge	19.50 to 20.50
Gray Forge, Southern	17.50 to 18.00
Lake Superior charcoal	23.00 to 24.00

Coke.—Selling has been resumed at slightly higher levels Foundry coke is now commanding $4.00 at the ovens, while furnace is quoted at $3.25, with slightly higher prices for quick delivery and possibly slight shading on first half contracts. The car situation is somewhat improved.

Finished Materials.—Structural materials and plates are the only easy feature of the current market, mills being in shape to make early deliveries of practically any assortments. Sheets and steel bars, on the other hand, are very strong, the latter being increasingly difficult to obtain. Bar iron shows much strength at the recently advanced quotation. Forging billets are scarce and are selling occasionally at about $37 Cleveland. Jobbers report a good demand in all lines. Boiler tube consumers are quietly covering for their requirements and an advance is probable.

Old Materials.—Delayed deliveries on pig iron have stimulated the scrap market and machine cast has advanced $1 over last week's quotations. Foundries are buying heavily and the situation exhibits unusual strength. We quote, Cleveland delivery, gross tons in the first paragraph, as follows:

Old iron rails	$26.00 to 27.00
Old steel rails (over 6 feet)	19.00 to 19.50
Old steel rails (under 6 feet)	18.00 to 18.50
Old car wheels	19.50 to 20.00
Steel boiler plate	15.50 to 16.00
Steel axles	22.00 to 23.00
Malleable iron (railroad)	17.00 to 17.50
Malleable iron (agricultural)	15.00 to 15.50
Heavy steel	16.50 to 17.00
Country mixed steel	14.50 to 15.00

We quote net tons as follows:

No. 1 R. R. wrought	$18.00 to 18.50
No. 1 busheling	14.75 to 15.25
No. 1 machine cast	17.00 to 17.50
Iron axles	25.00 to 26.00
Axle turnings	11.50 to 12.00
Wrought turnings (free from cast)	11.00 to 11.50
Grate bars	13.00 to 13.50
Pipes and flues	14.50 to 15.00
Tank iron	12.00 to 12.50
Hoop and band iron	9.00 to 9.50
Sheet iron	8.00 to 8.50
Wrought drillings	10.50 to 11.00
Stove plate	13.00 to 13.50
Cast borings	8.50 to 9.00

Since Nov. 1 those departments of the Allis-Chalmers Co., located at the Reliance works on Clinton street, Milwaukee, have been moving to the West Allis works.

CINCINNATI.

Quotations for Spot Higher.—Coke Has Also Advanced.

November 6.

Pig Iron.—The demand for prompt shipment iron is incessant and without abatement. The scarcity of offerings keeps the price advancing and quotations for spot iron are higher than a week ago. Southern iron for prompt shipment, or delivery before the first of next year, is now quoted at $20.00 to $22.00 Birmingham, and northern iron in southern Ohio has brought from $23.00 to $25.00 at furnace. There is more inquiry for prompt iron than offerings, and foundry shut downs are beginning to be reported with numerous requests for shipments to be hurried forward on contracts to prevent the stoppage of foundry operations.

For first quarter delivery the producers are now almost sold up both in the Ironton district and in the south, with quotations advanced. First quarter southern iron is quoted at $20.00 to $20.50 Birmingham, and northern at $23.00 to $24.00 at furnace.

For second quarter the market is more settled. Quotations for southern iron are $17.50 to $18.00 Birmingham, and for northern iron $21.00 to $22.00 at furnace.

Some prompt shipment Bessemer iron sold this week at $23.00 at northern furnace. High silicon iron is quoted at $27.00 for 8 per cent at furnace for this year's delivery and $26.00 for next year.

The nearby deliveries are now so irregular in price that it is difficult for anyone to tell what the market is from day to day. For instance, one sales agency has an open order to ship any spot iron that can be obtained to a large consumer and make the price a matter of settlement later on. It appears that the smaller consumers are in better shape for iron than the larger ones, as much of the inquiry for prompt iron comes from large melters. In this connection it may be said also that when prompt iron in any quantity comes out, it is going to large buyers quietly and does not come to light as market offerings. This tends to keep the available iron for quick shipment under cover and adds to the strain in values. We quote for first quarter of next year f. o. b. Cincinnati, as follows:

Southern Foundry No. 1	$23.50 to 24.00
Southern Foundry No. 2	23.00 to 23.50
Southern Foundry No. 3	22.50 to 23.00
Southern Foundry No. 4	22.00 to 22.50
Southern Foundry No. 1, soft	23.50 to 24.00
Southern Foundry No. 2, soft	23.00 to 23.50
Gray Forge	21.50 to 22.00
Northern Foundry No. 1	24.65 to 25.65
Northern Foundry No. 2	24.15 to 25.15
Northern Foundry No. 3	23.65 to 24.65
Jackson County Silvery, 8 per cent	27.15
Southern Charcoal	26.00 to 27.00

Finished Material.—The market continues firm in tone and active for most descriptions. Jobbers report active demand for small lots and quotations are well maintained. Specifications on contracts are good. We quote:

Bars at 1.83c, half extras, with dealers quoting 1.95c, for iron and steel out of store. Galvanized sheets No. 10 and No. 12, in car lots are 2.68c. We quote black sheets, No. 27 at 2.53c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.90c; No. 27, 2.70c; No. 16, 2.25c; No. 14, 2.20c; No. 12 2.15c. Tank plates are firm and sell out of store at 2c to 2.10c for ¼-inch and 2.10c for 3-16 Nos. 8 and 10. Beams and channels are quoted at 2.25c to 2.35c from stock and angles at 2.10c to 2.15c for base sizes.

Coke.—The market has continued to advance and prices are higher than a week ago in practically all districts. It is difficult to find ovens that will take business and shipments on contracts are slow. Prices in the leading coke producing districts are as follows:

Wise County, Va. Furnace Coke prompt shipment	$3.25 to 3.50 per ton
Wise County, Va. Foundry Coke on contracts	3.75 to 4.00 per ton
Pocahontas Furnace Coke prompt shipment	3.25 to 3.50 per ton
Pocahontas Foundry Coke on contracts	3.50 to 4.00 per ton
Connellsville Furnace Coke prompt shipment	3.00 to 3.25 per ton
Connellsville Foundry Coke on contracts	4.00 to 4.25 per ton
New River Foundry Coke on contracts	3.50 to 4.00 per ton
New River Furnace Coke, prompt shipment	2.75 to 3.00 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.70 to $1.75 per ton on $9.00 pig iron, plus 19 to 20 per cent of the advance on pig iron above $9.00 Birmingham.

Old Material.—The market continues firm and prices are showing an advancing tendency. We quote f. o. b. Cincinnati, as follows:

Old No. 1 railroad wrought, net tons	$17.50 to 18.00
Cast machine and foundry, net tons	15.50 to 16.00
Old iron rails, gross tons	25.00 to 26.00
Old steel rails, gross tons	18.50 to 19.00
Old short lengths, gross tons	17.50 to 18.00
Old iron axles, net tons	24.00 to 25.00
Heavy melting scrap, gross ton	19.50 to 20.00
Stove plate, net tons	12.50 to 13.00
Wrought turnings, net tons	10.00 to 10.50
Cast borings, net tons	8.00 to 8.50
Car wheels, gross tons	18.50 to 19.00

NEW YORK.

Foreign Pig Metal Taking Care of Excess Demand.—Great Activity in All Varieties of Steel.

Office of THE IRON TRADE REVIEW, Room 1315, No. 150 Nassau St., Nov. 5.

Pig Iron.—What was said of the pig iron market last week may be repeated today with equal truth. The demand is in excess of the supply and the eagerness to cover attendant upon this condition is still in evidence. Sales have been somewhat less than last week, chiefly because there was less iron to sell. Although prices have again risen the tension seems to be no more severe, and because it is no

worse the situation must be improved—no crisis can remain at its height. The evils of the situation are largely due to bad shipments and consumers are beginning to realize that deferred deliveries are not canceled deliveries. The excess demand is being supplied with foreign metal, and as one member of the trade remarked, "if there is not enough, it is only a question of importing more."

Sales have been sporadic and dealers are not inclined to talk about either prices or quantities. The total in the local market including foreign foundry and basic is somewhat less than 30,000 tons, a very good volume of business for an empty market. Nearly all of this iron was sold for delivery during the balance of this year or the first months of next. Buying for the second half has not really begun. The largest individual sale of foundry iron involved a lot of 5,000 tons of domestic product. Of Middlesborough and Scotch pig there were two lots of 4,000 tons each and a number of smaller quantities making up an additional 5,000 tons. Negotiations covering some large tonnages of basic are likely to be closed before this issue leaves the press. The prices quoted in these transactions are the extreme, $22, Philadelphia. Other sales of basic included one lot of 1,000 tons and another of 500 tons.

Sales of two lots of gray forge, one of 2,000 tons and one of 1,000 tons were reported. Most of the business in foundry grades was in small quantities, several involving very unusual shipment. Some odd lots brought extraordinary prices, but in very few cases has the price of $25 for foundry No. 2 been exceeded. A few tons of eight and ten per cent silicon iron brought $30, but in this as most other extraordinary transactions the case was exceptional and does not serve as a basis for market deductions. The same condition seems to characterize the entire market—most of the sales are of an exceptional nature and quotations are of comparative value only. The situation is aptly summed up by one of the local dealers who said, "It is almost impossible to find iron to sell, and when we do get a lot we demand as much for it as we can get."

Ferro-manganese has recovered what it lost in the recent decline and is again quoted at $80 to $85, tidewater.

The following are approximate prices of pig iron at tidewater for delivery during the second quarter of 1907:

Northern No. 1 Foundry	$23.50 to 25.00
No. 2 Foundry	22.75 to 24.00
No. 2 Plain	23.00 to 24.00
No. 1 Southern Foundry	22.00 to 23.00
No. 2 Southern Foundry	21.50 to 22.50
No. 3 Southern Foundry	21.00 to 22.00
No. 4 Foundry	20.00 to 21.00

Warrants and Standard Contracts.—With the almost complete disappearance of supplies from the yards trading on the New York Produce Exchange has been necessarily dull. In the latter part of last week, stocks in the yards had fallen below 4,000 tons. There were no sales of note during the week. The following are quotations for standard foundry contracts representing No. 1 and No. 2 foundry:

Standard Foundry Contracts.

	Bid.	Asked.
November	....	....
December	....	....
January	22.00	23.00
February	22.00	23.00
March	22.00	23.00

Finished Iron and Steel.—Thus far November has shown no great activity as far as structural material and rails are concerned, but in all other lines orders are coming in in very satisfactory volume. There is, however, enough business pending in rails and structural shapes to make the volume of the present month equal to that of last. The total bookings of the American Bridge Co. for October were slightly less than 62,000 tons. With the exception of one large railroad bridge job mentioned last week, there are no big tonnages in sight, but there are many additions to industrial plants to be built and railroads are inquiring for bridge materials aggregating over 30,000 tons.

Several considerable tonnages of rails may be expected to be placed after the pending election has cleared the atmosphere. The sales of the week have been individually rather small. The following sales have been reported up to and including today. The Alabama Great Southern, 1,800 tons; Prescott & Northwestern, 500 tons; Brooklyn Heights railway, 500 tons; Ohio & Southern Traction Co., 600 tons; a trolley road in California, 600 tons, and a manufacturer of frogs and switches, 500 tons.

Plates are in such good demand that an advance in price is again predicted, but not as yet officially realized. The demand comes from all sources, the needs of the tank builders being at present most in evidence. Producers are looking forward to the bids which are soon expected for the plates needed for the construction of the Robert Fulton, a new river boat to be built at Newburg. The Fulton will be fifty feet longer than the Hendrik Hudson and her hull will require 450 tons of plates. The demand for both iron and steel bars continues active. Bar iron mills are quoting 1.70c to 1.75c base Pittsburg, and steel bars are held practically at the same price.

The following are prices at tidewater: Angles 3 to 6 inches x ¼ inch and heavier, 1.84½c; beams, 3 to 15 inches, 1.84½c; tees, 3 x ¼ inch and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine boiler, 2.41½c; refined iron bars, 1.84½c to 1.89½c; soft steel bars, 1.84½c to 1.89½c; sheets, No. 28 black, 2.60c.

Old Materials.—The scrap market has been rather dull, both dealers and consumers having confidence in their own opinions as to values and these opinions being too wide apart for business. Cast scrap is the exception and is in active demand, but supplies are not large. There is some inquiry for wrought railroad scrap, and one sale of 500 tons is reported. Steel scrap is dull, consumers apparently being in no humor to buy The following are prices approximately f. o. b. tidewater:

Old iron rails	$25.00 to 25.50
Old steel rails, long lengths	16.50 to 17.00
Old steel rails, short pieces	15.50 to 16.00
Relaying rails	25.00 to 26.00
Old car wheels	18.00 to 19.00
Old iron car axles	29.00 to 30.00
Old steel car axles	20.00 to 21.00
Heavy melting steel scrap	16.00 to 17.50
No. 1 railroad wrought scrap	20.00 to 21.00
Iron track scrap	18.00 to 19.00
Wrought pipe	13.50 to 14.00
Cast borings	11.00 to 11.50
Wrought turnings	12.50 to 13.75
Heavy Cast Scrap	17.50 to 18.50

PHILADELPHIA.

Market is Active.—Foreign Pig Has a Good Influence.

November 6.

Pig Iron.—The tendency of prices is still upwards, though there has been no sensational advance during the past week. The importations of English iron are undoubtedly having an effect in keeping down the rather fancy prices that have been asked for spot shipments, as considerably more than 100,000 tons of the Middlesborough product, will reach Atlantic ports before the close of the year. The same interest that was referred to last week as bringing a half dozen cargoes of English iron to this port has increased its order by several cargoes, and has also arranged for shipments of Scotch iron to New York. Two cargoes of the English iron have been sold entire to a local firm of pipe founders and a large steel-making plant. The prices range from $21.50 to $22.75 a ton at the dock. One factor that is having its influence on furnace men in sustaining prices is the fear of insufficient ore supplies during the coming winter and spring. Complaint is

already made that the railroads are not sending enough cars to the lake ports, though this is the season when the shipments of coal to such ports should insure a large supply of return cars for ore. Both basic and low phosphorus iron have been in great demand, and basic is expected to go still higher, to bring it nearer to a parity with the advance in foundry irons. It is almost needless to say that the market continues intensely active and that no producer has any trouble in selling all the iron he can make up to July, 1907. Prices for the first and second quarters of next year may be quoted about as follows:

No. 1X Foundry	$23 50 to 24 50
No. 2X Foundry	22.75 to 23 75
No. 2 Plain	22 25 to 22.75
Standard Gray Forge	20.00 to 20 50
Basic	20.50 to 21 25
Low Phosphorus	26 50 to 27.00

New Material.—The market for finished material is running along so smoothly and strongly, with the mills pressed to their full capacity, that there is no marked feature to be noted. Some of the mills in this territory are still tied up by strikes, and their withdrawal from the market undoubtedly adds to its strength. Prices are firm, and in many cases touch the outer range in the following quotations: Beams, channels and angles according to specifications, 1.83½c to 2c; refined iron bars, 1.83½c to 1.88½c; steel bars, 1.78½c to 1.83½c; plates, 1.73½c to 1.83½c.

Old Material.—There is an excellent market for scrap, and the mills are buying freely. Prices show no great changes, but in a few cases, notably stove plates, No. 1 forge-fire scrap and axle turnings are higher. Quotations are about as follows:

Old steel rails	$18.50 to 19.00
No. 1 steel scrap	18.25 to 18.75
Old steel axles	22.50 to 23.00
Old iron axles	31.00 to 32.00
Old iron rails	26.00 to 26.50
Old car wheels	21.00 to 21.50
Choice scrap, R. R. No. 1 wrought	22.00 to 22.50
No. 1 yard scrap	20.00 to 20 50
Machinery scrap	19.00 to 19.50
Low phosphorus scrap	22.50 to 23.00
Wrought iron pipe	16.00 to 16.50
No. 1 forge fire scrap	16.00 to 16.50
No 2 forge fire scrap, ordinary	12.00 to 12.50
Wrought turnings	14.25 to 14.75
Axle turnings, heavy	15.25 to 16.00
Cast borings	11.00 to 11.50
Stove plates	14.75 to 15.25

Metal Market

CHICAGO.

November 6.

Demand for metals is limited by the supply. Material for immediate shipment is hard to obtain. Prices are without noticeable change. Sheet zinc is holding its own at 7.90c list f. o. b. La Salle in carlots of 60-pound casks. Copper is scarce, Lake being quoted nominally, 24c to 24½c; casting is from ¼c to ½c lower. Pig tin, 46c and spelter, 6.50c to 6.60c in carload lots; lead desilverized, 6.10c to 6.15c for 50-ton lots. Cookson's antimony is very scarce and higher prices are expected. The quotation today is 28½c; other grades from 26½c to 27½c.

Demand for old metals is inclined to fall off because of the high prices asked. We quote dealers' buying prices, as follows: copper wire, 18½c; heavy copper, 18c; copper bottoms, 17c; copper clips, 17¾c; red brass, 17¾c; yellow brass, heavy, 13c; yellow brass borings, 12c; red brass borings, 13¾c; light brass, 10c; pipe lead, 5.15c; tea lead, 4¾c; zinc, 4½c; tin foil, 31c; pewter, No. 1, 25c.

ST. LOUIS.

November 6.

Lead rules firm at $5.87½ to $5.90 for Missouri brands. Special soft is quoted at $6. Spelter is active and higher at $6.20 to $6.22½. There were heavy sales at $6.20 and the price was advanced. Ore prices were higher in the Missouri-Kansas district for both lead and zinc on account of active competition.

NEW YORK.

November 5.

Pig Tin.—Buying has been extensive both here and abroad and the market closes firm with slightly higher prices.

The following are today's quotations. Spot, 43.05 to 43.20; November, 43.05 to 43.20; December, 43.05 to 43.20; January, 43.05 to 43.20; London, £196 10s and £197 10s. Arrivals for the month to date, 775 tons. Afloat, 2,485 tons.

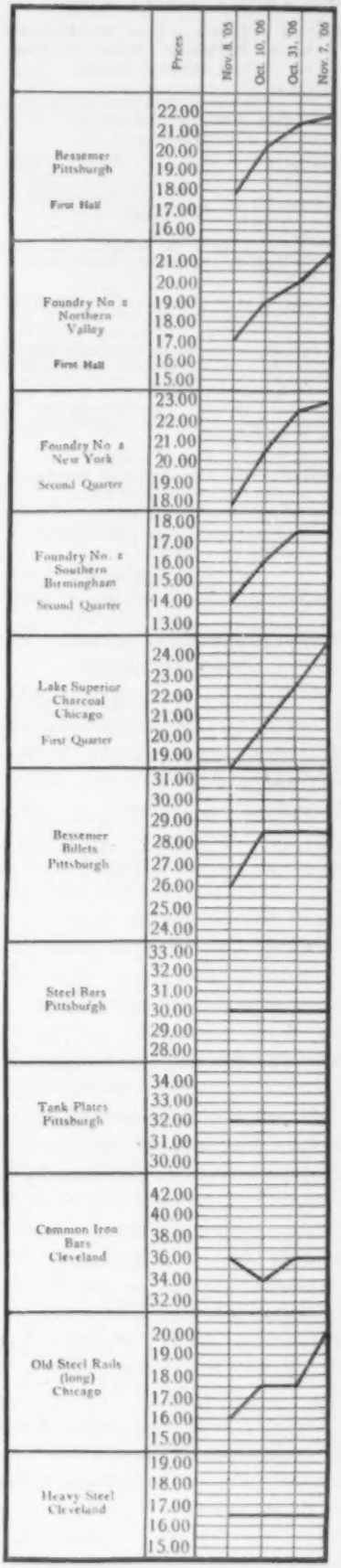
Copper.—The weakness seems to have given place to a more confident tone, although the volume of business has been relatively small. Today's quotations: Lake, 21¾ to 22½; electrolytic, 21½ to 22; casting, 21¼ to 21¾; London, £99 and £99 15s. Exports for the month to date, 1,348.

Lead.—Refined lead has been in fair demand but today closes rather quiet. Today's quotations: 5.85 to 5.95; St. Louis, 5.90. London, £19 7s 6d.

Spelter.—The market has been quiet with only a fair demand. Today's quotations: 6.20 to 6.30; St. Louis, 6.15 to 6.20; London, £27 10s.

The Toronto (Can.) Railway Co., in addition to constructing cars for its own line, is gradually increasing its work for outside companies. It has begun the construction of six cars for the Monterey, Mexico, street railway, largely owned by William Mackenzie and his associates, of the Toronto Railway Co., and is also building cars for the Toronto & York Radial lines and the Winnipeg street railway.

PRICE CHART.



THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades.

PUBLISHED EVERY THURSDAY BY
THE PENTON PUBLISHING CO.
CLEVELAND

BOSTON DULUTH
CHICAGO NEW YORK
CINCINNATI PHILADELPHIA
PITTSBURG

Subscription, $3.00 per annum. To Foreign Countries, $4.50. Advertising Rates Furnished on Application.

Change of advertising copy must reach this office ten days preceding date of publication.

The Cleveland News Co., will supply THE IRON TRADE REVIEW through the regular channels of the American News Co.

European Agents: The International News Company, Breams Building, Chancery Lane, London, E. C., England.

ENTERED AT THE POST OFFICE AT CLEVELAND, AS SECOND CLASS MATTER

PRINTED IN AN OPEN SHOP

November 8, 1906.

THE BESSEMER STEEL PROCESS YIELDING.

No statement has been made by the United States Steel Corporation as to its general policy regarding the Bessemer and open-hearth steel processes. The decision made public a fortnight ago that the Bessemer department at Duquesne would be abandoned as the progress of work on the new open-hearth furnaces required is its first distinct step in the direction of decreasing its Bessemer steel output. It has made many steps towards increasing the output of open-hearth steel. At both Chicago and Pittsburg it has made large additions to its open-hearth capacity, while the very large plant being built at Gary, Ind., is to use that process exclusively. Thereby the corporation's proportion of Bessemer steel to its total steel output has been made to diminish, although the actual tonnage of Bessemer steel increases through improved equipment and more rapid driving. The abandonment of the Duquesne Bessemer plant is therefore a distinctly new step.

Inasmuch as the steel corporation has by common consent been credited with the possession of very heavy reserves of strictly Bessemer ores, its movements in this direction are particularly significant, as by this token it should be less ready than others to favor the basic open-hearth process. The steel corporation, and before it the Carnegie Steel Co., came to be looked at in this light at a time when non-Bessemers were not much thought of.

It is well known that it has been increasingly difficult to find Bessemer pig iron within the phosphorus limit, and that much Bessemer steel has of late been turned out which contained somewhat over the usual limit of 0.10 per cent phosphorus. There is a moderate supply of Lake Superior ores quite low in phosphorus, and by mixing them with ores slightly above the limit, an average result within the limit could be obtained, but, as ore values run now, this is an increasingly expensive practice. It should not be inferred, however, that there is any marked tendency towards the much greater employment of the acid open-hearth steel process, using ordinary Bessemer pig or low phosphorus pig, because such is not the case. In 1905 the United States made nearly 30 per cent more pig iron, and 35 per cent more steel, than in 1902, but the production of acid open-hearth steel showed a slight decline. The decline in ingots alone was over 10 per cent, while castings showed an increase.

It may be accepted as fundamental that the Bessemer steel process is in no respect yielding to the acid open-hearth process, but only to the basic open-hearth process. The growth of the steel casting end of the acid open-hearth industry is a separate matter, as it draws from rolled forms and from iron castings, indiscriminately.

Ever since the manufacture of basic open-hearth steel attained important proportions—it passed the million ton mark in 1897—it has been pushing the Bessemer process, but the latter has kept ahead and it is not safe to make any prediction as to when the one will overtake the other. Our total steel production almost doubled from 1899 to 1905; it more than doubled from 1898 to 1905, but the make of open-hearth steel tripled in that time while Bessemer steel increased by only a little over one-third. In 1905 we made substantially 20,000,000 tons of steel, with nearly 11,000,000 tons of Bessemer and nearly 9,000,000 tons of open-hearth.

Outside of the influence towards the basic open-hearth process in preference to the Bessemer which is exerted by the ores, there are two others, and of these two that of demand must naturally be mentioned first. In one line after another consumers are asking for open-hearth steel. At first engineers were somewhat disinclined to accept basic open-hearth steel, but the prejudices have almost entirely disappeared. Steel makers willingly yield to the demands, but where extra costs are involved, it is the buyer who may demur. In this case the difference in cost is too slight to form much of a barrier.

The third reason for the swing from Bessemer to open-hearth is the abundance of capital. It costs considerably more money to build an open-hearth steel plant than a Bessemer steel plant of equal capacity. An open-hearth plant is cheap only in the sense that a small one can be built, whereas a Bessemer plant of small capacity would not be practical. Comparatively few Bessemer vessels of less than 10 tons capacity are now operated. The United States Steel Corporation could have increased its steel-making capacity much more if it had spent on Bessemer steel plants the large sums it has invested in the past few years in extensions to its open-hearth departments. The abandonment of the Bessemer department at Duquesne will not involve a decrease in the steel output at that plant, as the output of the 18 60-ton open-hearth furnaces being built will be slightly larger than the present Bessemer steel output.

It is interesting to note that a few years ago apprehensions were entertained as to the continued growth of the basic open-hearth process, because its inception on a large scale was due to the desire to utilize scrap, while it was obvious that the supply of scrap could not grow at a sufficiently rapid rate to support the rapid growth of the process. The direct metal and other processes have largely obviated the necessity for scrap, and it is now used, by the largest interests, chiefly as a convenience. It is no longer a necessity. There will always be a good demand for it, but the industry can, of necessary, grow without it.

NEW CONSTRUCTION IN THE UNITED STATES.

UNPRECEDENTED INCREASE IN NUMBER OF NEW PLANTS.

Annual Capacity of New Blast Furnaces Nearly 7,000,000 Tons—Popularity of the Open-Hearth Maintained.

The United States has entered upon a period of what promises to be a time of the most extensive construction of blast furnaces and open-hearth steel plants in its history. The only year whose prosperity is comparable with that of 1906 is 1902, and while the actual number of plants being built is not so large as it was in the midsummer of 1902, the new construction authorized and certain to be carried out, unless there should be a totally unexpected slump in business exceeds that of 1902, the increase being largest in furnaces making Bessemer and basic pig iron.

In the issue of July 31, 1902, THE IRON TRADE REVIEW devoted several pages to a description of the new capacity then being provided for the production of iron and steel. There were then thirty-four blast furnaces under construction, with an estimated annual capacity of 4,300,000 tons. The blast furnaces then being remodeled, enlarged or soon to be rebuilt, numbered twelve. The additional capacity thus provided was about 600,000 tons a year, and the total addition to the blast furnace capacity, all expected to be available before the end of 1903, was estimated at 4,900,000 tons a year. There are now under construction in the United States twenty-one stacks, with a total annual capacity of 2,310,000 tons. Seven furnaces have been recently completed, with a capacity of 968,000 tons. The building of twenty-seven new furnaces, having an annual capacity of 2,965,000 tons has been authorized. There are three old furnaces in Pennsylvania, and one in Michigan, long idle, with a capacity of 315,000 tons, which are soon to be blown in. This makes a grand total capacity of 6,558,000 tons for furnaces completed, under construction and authorized, the number being fifty-nine. As no account has been taken in these figures of the rebuilding of a number of furnaces, especially in the south, involving a large increase of capacity, it is a safe estimate to say that the new furnace capacity to be completed at no far distant day, is nearly 7,000,000 tons per year.

The summary of blast furnace construction by states is shown in the accompanying table:

Blast Furnaces Under Construction.

Seven in Chicago district, annual capacity	560,000	tons
One in eastern Pennsylvania, annual capacity	150,000	"
One in eastern Pennsylvania, annual capacity, (Spiegel.)	20,000	"
One at Buffalo, annual capacity	180,000	"
One at Haselton, O., annual capacity	140,000	"
One at Jackson, O., annual capacity	35,000	"
One at Toledo, O, annual capacity	135,000	"
Six in western Pennsylvania, annual capacity	830,000	"
One in Colorado, annual capacity	125,000	"
One in Alabama, annual capacity	135,000	"
Twenty-one stacks, total annual capacity	2,310,000	"

Completed.

Two in Chicgo district, annual capacity	350,000	tons
One at Donaghmore, Pa. (experimental.)		
One at Haselton, O., annual capacity	140,000	"
Three in Pittsburg district, annual capacity	478,000	"
Seven, annual capacity	968,000	"

Authorized.

Fifteen in Chicago district, annual capacity	1,085,000	tons
Four in eastern Pennsylvania (rebuilding), annual capacity	500,000	"
One in New York, annual capacity	210,000	"
Seven in Pittsburg district, annual capacity	1,170,000	"
Twenty-seven stacks, annual capacity	2,965,000	"

Old Furnaces to be Blown in.

Three in eastern and central Pennsylvania, annual capacity	190,000	tons
One in Michigan, annual capacity,	125,000	"
Four stacks, annual capacity	315,000	"
Grand total, fifty-nine stacks, annual capacity	6,558,000	"

OPEN-HEARTH CAPACITY.

In July, 1902, the open-hearth furnaces under construction were 103, with an annual capacity of about 2,700,000 tons. The open-hearth furnaces planned were fifteen, with an annual capacity of 400,000 tons. There are now under construction 47 open-hearth furnaces, with an annual capacity of 1,016,500 tons, and 21 furnaces with an annual capacity of 530,000 tons, have recently been completed. There are 30 open-hearth plants with an annual capacity of 1,194,000 tons authorized, making the total new open-hearth capacity 2,740,000 tons for 98 furnaces, against 3,100,000 tons in 1902 for 118 furnaces. This does not include the open-hearth furnaces building for steel foundries, which are more numerous than they were in 1902.

The new open-hearth construction is summarized in the accompanying table.

Open-Hearth Furnaces Under Construction.

Thirty-one in Chicago district, annual capacity	550,000	tons
Five 75-ton at Steelton, Pa., annual capacity	112,500	"
Five at Staten Island, annual capacity	99,000	"
Two Tropenas in New York, annual capacity	120,000	"
One in Syracuse, annual capacity	90,000	"
Two 50-ton at Niles, annual capacity	30,000	"
One 50-ton at Pittsburg, annual capacity	15,000	"
Forty-seven, annual capacity	1,016,000	"

Completed.

Seven in Chicago district, annual capacity	105,000	tons
Fourteen in Pittsburg district, annual capacity	425,000	"
Twenty-one, annual capacity	530,000	"

Authorized.

Twenty-four in Pittsburg district, annual capacity	1,104,000	tons
Six 50-ton at Cleveland, annual capacity	90,000	"
Thirty, annual capacity	1,194,000	"
Grand total, 98, annual capacity	2,740,000	"

Bessemer Plants.

In 1902 no Bessemer construction was reported. The most important plant completed this year is that at Youngstown,

having two 10-ton converters, with an annual capacity of 360,000 tons. Adding this tonnage to the open-hearth we have a grand total of 3,100,000 tons of steel making capacity.

CHICAGO DISTRICT.

Seven Blast Furnaces and Thirty-One Open-Hearth Furnaces Under Construction.

Chicago, Nov. 1.—The probabilities of another famine in either iron or steel in the west will be eliminated for several years upon the completion of the new furnaces and mills now under construction in this section. New construction in the past has been of a spasmodic nature, undertaken only in times of great pressure for material and without any relation to the consumptive growth of the country, with the resulting effect that in periods of unusual prosperity, demand has heavily exceeded production and consumptive operations have been seriously retarded. It is only in recent years that a fixed policy of expansion has been followed, and in the Chicago district this has had its best exemplification. The Gary plant overshadows all other undertakings in this district, but the investment of the tremendous amount of capital involved in these works and the neighboring town of the United States Steel Corporation is substantial evidence of the wisdom of other extensions in this vicinity by other interests. At the present time, there are seven blast furnaces in various stages of completion, with a combined daily capacity of 3,100 tons, and 15 furnaces projected, with an estimated daily tonnage when completed of 7,000. Only four of these furnaces will be devoted to the manufacture of foundry pig; the remaining 15 will be engaged exclusively in the production of steel-making irons. There are also 31 open-hearth furnaces under construction, not including those being built for the exclusive manufacture of steel castings. This year, the Illinois Steel Co. increased its pig iron capacity 30,000 tons a month, and its open-hearth steel output 20,000 tons a month; but in its new structural mill, universal plate and light rail mills at South Chicago, and in the extensions to its spike, splice and bolt plant at Joliet, has provided more than enough finishing capacity to offset this tonnage. The increase to the blast furnace capacity at Milwaukee by the modernization of the two stacks there, has also been offset by the improvements to the bar mills in that plant resulting in greater output of finished material. A new sheet mill has been placed in operation this year at Atlanta, Ind., with a capacity of 1,400 tons a year; and with the extensions undertaken by the Inland Steel Co. enabling greater output of this product by this interest, Chicago will be better situated than ever before for a quick supply of black and galvanized sheets. The output of iron and steel bars will also be greatly increased upon the completion of the new mills for the manufacture of these products being built by the Indiana Steel Co., International Harvester Co., Inland Steel Co., and the American Rolling Mill Corporation. The Gary plant will also manufacture sheared and universal plates, standard sections, structural shapes, etc.

Blast Furnaces Under Construction.

Four, 500-ton capacity each, Indiana Steel Co., Gary, Ind.

One, 400-ton capacity, Inland Steel Co., Indiana Harbor.

One, 350-ton capacity, Federal Furnace Co., South Chicago.

One, 350-ton capacity, Northwestern Iron Co., Mayville, Wis.

Blast Furnaces Projected.

One, 400-ton capacity, Inland Steel Co., Indiana Harbor, Ind.

One, 350-ton capacity, Federal Furnace Co., South Chicago.

One, Iroquois Furnace Co., South Chicago.

Twelve, 500-ton capacity, Indiana Steel Co., Gary, Ind.

Blast Furnaces Completed This Year.

One, 500-ton capacity, Illinois Steel Co., South Chicago.

One, 500-ton capacity, Illinois Steel Co., Joliet, Ill.

Open-Hearth Steel Furnaces Under Construction.

Twenty-eight, 60-ton, open-hearth furnaces, Indiana Steel Co., Gary, Ind.

Three, 50-ton, open-hearth furnaces, Inland Steel Co., Indiana Harbor, Ind.

Open-Hearth Steel Furnaces Completed.

Seven, 50-ton, open-hearth furnaces, Illinois Steel Co., South Chicago.

Rolling Mill Capacity Under Construction.

Illinois Steel Co., South Chicago.

One, 30-inch, universal plate mill to roll plates from six inches to 30 inches wide to 80 feet long; capacity 7,500 tons a month.

One, 24-inch, light rail mill to roll from 12-pound to 45-pound sections; capacity 7,500 tons a month.

Illinois Steel Co., Joliet, Ill.

One track-bolt and nut plant, capacity 20,000 kegs per month.

One splice bar plant for making rail joints of the Continuous and Wolhaupter types, capacity 11,000 tons per month.

Indiana Steel Co., Gary, Ind.

Rail mill to roll standard sections; capacity, 75,000 tons a month.

Sheared plate mill; capacity, 25,000 tons a month.

Billet, structural and merchant mills; capacity not known.

International Harvester Co., Deering.

Morgan continuous bar mill consisting of eight stands of 16-inch rolls, three stands of 14-inch rolls, with cooling beds and straightening machines. Capacity, 6,250 tons a month.

American Rolling Mill Corporation.

One 21-inch and one 10-inch bar mills; capacity, 150 tons a day.

Inland Steel Co.

One bar mill to roll down to 3/8-inch rounds.

PITTSBURG DISTRICT.

Many Blast Furnaces and Steel Plants Authorized and Building.

The very heavy demands of the finishing mills and attendant scarcity of semi-finished material beginning early this year, and the extreme scarcity of pig iron which began to make itself felt about the middle of the year, together with the fact that the big steel interests already have business in sight for the first half of next year, if it is not already on the books and there are no indications of hurtful influences, is admirably reflected in the authorization of new producing capacity of raw and semi-finished products.

The Carnegie Steel Co., alone, since the first of the present year has completed new blast furnaces with annual combined capacities of 325,000 tons of pig iron and is now building or has authorized the construction of blast furnaces with 600,000 tons capacity. For the production of open-hearth steel, for which the demand has increased very rapidly in finished lines, eighteen new furnaces at Duquesne have been authorized and ten at Homestead have been completed. The Duquesne annual capacity will be 744,000 tons and the capacity of the Homestead open-hearth plant is 360,000 tons.

The most radical change is at Duquesne where the Bessemer converter plants will be abandoned to make way for the open-hearths.

The Jones & Laughlin Steel Co., has authorized the construction of four 500-ton blast furnaces and six Talbot open-hearth furnaces, the latter of 200 tons daily capacity each.

Blast Furnaces Authorized.

Duquesne Plant, Carnegie Steel Co.

Two stacks, Nos. 5 and 6. Annual capacity each 150,000. Total 300,000 tons.

Jones & Laughlin Steel Co.

Four stacks. Annual capacity each, 180,000 tons. Total .....720,000 tons.

National Tube Co., McKeesport, Pa.

One stack, annual capacity..150,000 tons.

Blast Furnaces Building.

Homestead Plant.

Two stacks Nos. 6 and 7. Annual capacity each 150,000 tons. Total 300,000 tons.

Josephine Furnace & Coke Co.

Josephine, Indiana Co., Pa. (Corrigan McKinney & Co.) One stack, annual capacity .....140,000 tons.

Josephine Furnace Co., Sharpsville, Pa.

One stack (ready July, 1907), annual capacity .....125,000 tons.

One stack, (ready Nov., 1907,) annual capacity .....125,000 tons.

Perry Iron Co., Erie, Pa.

One stack, (ready June, 1907.) Annual capacity .....140,000 tons.

Blast Furnaces Completed.

Midland Steel Co., Midland, Pa.

One stack, 85 x 21-2....153,000 tons.

Isabella Plant, Carnegie Steel Co.

Two stacks, annual capacity..... ..... 325,000 tons.

Open-Hearth Furnaces Authorized.

Duquesne Plant, Carnegie Steel Co.

Eighteen open-hearth furnaces, annual capacity .....744,000 tons.

Jones & Laughlin Steel Co.

Six Talbot open-hearth furnaces, annual capacity each, 60,000 tons, total .....360,000 tons

Open-Hearth Furnaces Completed.

Follansbee Bros. & Co., Follansbee, W. Va.

Two open-hearth furnaces, annual capacity .....39,000 tons.

Colonial Steel Co., Colona, Pa.

Two open-hearth furnaces, annual capacity .....21,000 tons.

Homestead Plant, Carnegie Steel Co.

Ten open-hearth furnaces, annual capacity ..... 360,000 tons.

Open-Hearth Furnaces Building.

Mackintosh Hemphill Co., Pittsburg, Pa.

One open-hearth furnace, annual capacity .....15,000 tons.

CENTRAL PENNSYLVANIA.

Large Increase Through New Equipment and Additions.

Harrisburg, Pa., Nov. 1.—Central Pennsylvania affords comparatively little in the way of new construction, but there has been a marked increase of product through installation of new machinery and some enlargements. Shipments from the Juniata, Susquehanna and Schuylkill valleys have been growing steadily in the past few years.

The most important extension of plant now in progress is the building of the new open-hearth steel plant by the Pennsylvania Steel Co. at Steelton. This addition is to contain five furnaces of 75 tons capacity, the largest in the country, and they will be put into operation early in the new year. The Steelton Works' open-hearth plant now consists of fourteen furnaces, nine basic and five acid, with an annual capacity of over 250,000 tons of ingots and 18,000 tons of castings.

In addition the Pennsylvania Steel Co. is building a coke-oven plant at Steelton which will be worked next year. It will have 120 ovens with 400,000 capacity.

The only new furnace is a small experimental one built at Donaghmore in the Cornwall region by the Lebanon Reduction Co., and now in blast.

The Central Iron & Steel Co. has completed improvements to its No. 2 Paxton furnace at Harrisburg and it will soon be blown in with an increased capacity. With this furnace started the company will install the molten metal method of shipping metal to its open-hearth steel plant. Enlargement of the open-hearth plant is uncertain.

There have been additions and changes of more or less note made to the Lebanon works of the American Iron & Steel Mfg. Co., the Birdsboro works of the E. & E. Brooke Iron Co., the Pennsylvania Railroad Co.'s shops at Altoona and Harrisburg; the locomotive and other repair shops of the Philadelphia & Reading Railway Co. at Reading.

The Eastern Steel Co. is understood to be contemplating additional improvements, having started this year the mills already mentioned in THE IRON TRADE REVIEW. The Harrisburg Rolling Mill Co. and Eleanor Iron Works at Tyrone Forges, have made changes, the former changing to a bar mill. The Harrisburg Foundry & Machine Works will enlarge its works. The Duncannon Iron Co. has built a new mill and rebuilt part of its plant.

A large addition has recently been completed for the Middletown Car Works and other car building plants, notably Berwick, have added to their capacity by annexes to departments.

There have been rumors of another blast furnace to be erected at Steelton, but these have not been confirmed by the officials of the Pennsylvania company. Equally uncertain are changes and improvements to the plants of the Susquehanna Iron & Steel Co., which has for some time been in receivers' hands. The favorable reports of the reorganization plan for the company, however, are taken to indicate its early emergence from difficulties.

EASTERN PENNSYLVANIA.

Increased Blast Furnace Capacity of 360,000 Tons Expected.

In comparison with the west, eastern Pennsylvania, so long the center of the iron and steel trade, may be said to be doing very little toward increasing the permanent productive capacity of the country. In the line of pig iron production the most important work is that of the Bethlehem Steel Co., which is building a new blast furnace with a capacity of about 150,000 tons a year. When this is completed next spring it is proposed to tear down one of the old furnaces and rebuild it and continue this process until all four have been replaced by thoroughly modern structures. The productive capacity of the plant will thus be increased from 200,000 tons a year to 600,000 or 700,000, but this work will be extended over several years.

The only other entirely new furnace in this territory is one under construction by the New Jersey Zinc Co., of Pennsylvania, at Palmerton, Carbon county, Pa. which will have a capacity of 20,000 tons of spiegeleisen from zinc residuum.

After 13 years of idleness the Anvil furnace of the Pottstown Iron Co. will be put in operation in January by the Warwick Iron & Steel Co., and is expected to turn out 50,000 tons of foundry iron a year, and about the same time the Maryland Steel Co. hopes to blow in the furnace leased by it from the Tidewater Steel Co. at Chester, with an annual capacity of 50,000 tons and idle for three years. In central Pennsylvania the two Saxton furnaces, with a capacity of 90,000 tons, will be put in operation by their new owner, ex-Congressman Joseph E. Thropp, about midwinter.

The total annual capacity of these furnaces, new and old, which may all reasonably be expected to be in blast in the spring of 1907 is 360,000 tons.

In other lines the new work of the Bethlehem Steel Co. still leads in importance. It is expending $12,000,000 upon a new mill at South Bethlehem for turning out special structural shapes, with an annual capacity of 200,000 tons, which it is expected to have in operation next fall. This new

plant will consume the entire capacity of the new blast furnace, and considerably more.

The J. A. Roebling's Sons Co., of Trenton, N. J., is building a very extensive plant at Kinkora, N. J., for the rolling of rods, upon which it is reported several millions of dollars are being expended. The enterprise includes the construction of a model town for the employes of the company, and on a smaller scale resembles the project of the United States Steel Corporation at Gary, Ind. Upon the completion of the plant next year much of the work now done in the Trenton mills will be transferred there.

Nearly opposite on the Pennsylvania side of the Delaware river, Andrew S. McNeal, who sold his pipe works at Burlington, N. J., to the United States Cast Iron Pipe & Foundry Co., has bought some 150 acres of ground, with a view to the erection of new works there, but the project has not reached the constructive stage yet.

At Scranton the Kemmerer Iron & Steel Co. is building a puddling and rolling mill, with a capacity of 2,000 tons a year, which is expected to go into operation before long.

The Worth Bros. Co., which recently bought the Coatesville rolling mill of the Saxton Furnace Co., is expected to utilize the plant, which has been idle for some years, but its plans have not been made public.

LITTLE NEW CONSTRUCTION

In New England and New Jersey. — Activity in Western New York.

The territory embracing the New England states, New Jersey and eastern New York, although its consuming capacity during the past year has increased enormously, has done little or nothing to increase the production of pig iron and crude steel within its own boundaries.

The blast furnace industry in this territory has not recovered from the effects of the general westward shift of the iron industry in the early nineties. A considerable number of the smaller stacks which then went out of blast are now superannuated and will most likely never resume. Practically all the furnaces able to produce iron are now in operation. Some have been remodeled and one or two are still cold in process of repair, but these will resume at the earliest possible moment. The only increase of capacity during the year has been made at the Secaucus furnace of the Hudson Iron Co., the capacity of which has been increased about 20 or 25 per cent. New boilers and a new blowing engine have been installed and a number of improvements have been made. The furnace has been ready to go into blast for some months, but has been held in idleness for lack of ore. The company's mines are now producing regularly and it is announced officially that fires will be started within a week. The output, from 100 to 110 tons per day, will be foundry iron, some of which has already been sold.

The chief addition to the steel making capacity of the territory is the new plant of Milliken Bros., Inc., Staten Island. The five open-hearth furnaces have a capacity of about 10,000 tons per month. Three have been in operation for a fortnight, the first cast having been made on Oct. 25. Only ingots have been produced thus far, but the blooming mill will in all probability be turning before this issue goes to press. About 5,000 tons of the steel produced will be fabricated in the shops as soon as the equipment can be put in readiness.

In New England a number of manufacturers who use steel have put in small producing plants for their own use. The individual output will be small and practically none of the crude material will reach the market.

In striking contrast with the inactivity of the eastern part of the state is the important construction and extension work now under way in the western end of New York, particularly in the Buffalo district. This is to be explained as another evidence of the growing popularity of lake front sites for both iron and steel making, a factor which largely accounts for the westward shift of the industry. In the way of increased pig iron production, the coming year will witness in this section the blowing in of two extremely large blast furnaces, the product of both of which, however, will be utilized directly for steel-making and hence will not materially affect the amount of merchant iron. Work was recently begun on an additional stack, (No. 7) for the Lackawanna Steel Co., near Buffalo. It will probably be ready for the torch about May, 1907, and will have an annual capacity of about 240,000 tons. For the new plant of the New York State Steel Co., now building nearby, the construction of a 500-ton furnace is soon to be begun. It will probably not be ready for operation before the middle of next fall. The steel plant is rapidly nearing completion and will probably be operating early in the new year. Its steel-making equipment consists of two 200-ton Tropenas open-hearth converters, giving it an annual capacity of between 100,000 and 120,000 tons of ingots. Slabs, blooms and billets will be manufactured. The new plant of the Halcomb Steel Co., Syracuse, which went into operation early in the year, is equipped with basic and acid open-hearth steel furnaces and crucible steel melting furnaces as well as other equipment for the production of bars, sheets, steel wire and tool steel.

THE STATE OF OHIO.

Only Bessemer Plant Completed in 1906.—Open-Hearth Increasing.

Every important iron producing section of Ohio has its quota of new construction work either recently completed or under way, and as a result its 1907 output will be materially in excess of that of the year now drawing to a close. Two of the largest new stacks will find their output entirely consumed in steel making at the plant with which they are connected, reference being made to the two big furnaces of the Republic Iron & Steel Co. at Haselton, near Youngstown. One was blown in Oct. 5 and the other will be ready for the torch by Jan. 1; the annual capacity of the former is 135,000 tons and of the latter 145,000 tons. With these exceptions, the Ohio furnaces now building will produce merchant iron. The Toledo Furnace Co. of Cleveland will have its second stack at Toledo ready for operation by the beginning of the new year, thus increasing its annual output about 135,000 tons. The Jackson Iron & Steel Co. has broken ground for a smaller stack near Jackson, which will not be ready for the torch before midsummer. Its product will be chiefly high silicon irons from native ores and will be about 35,000 tons annually. Two additional furnaces are in prospect in the Ironton region and will probably be erected within the near future. One is to be built by E. J. Bird and associates of that city and the other by Charles Peters and associates. The construction of a large furnace in the vicinity of Hamilton, O., has been rumored, but nothing definite has developed and the project has not been heard from for several months. Furnace No. 4 of the United States Steel Corporation at Mingo Junction was blown in Jan. 15 last; its annual capacity is 150,000 tons.

Ohio Furnaces Recently Blown In.

Stack No. 4, Steel Corporation, Mingo Junction. Annual capacity 150,000.

Republic Iron & Steel Co., Haselton. Annual capacity 135,000.

Furnaces Now Building.

Republic Iron & Steel Co., Haselton. Ready Jan. 1. Annual capacity 145,000.

Toledo Furnace Co., second stack.

Ready Jan. 1. Annual capacity 135,000.

Jackson Iron & Steel Co., Jackson. Ready July 1. Annual capacity 35,000.

The largest recent addition to the steel capacity of Ohio was occasioned, of course, by the completion of the plant of the Youngstown Sheet & Tube Co., Youngstown. Two 10-ton Bessemer converters supply the steel for the various finishing mills of the company, which are remarkably complete. The annual ingot capacity of the works is 360,000 tons. This plant is now in complete operation, but numerous improvements are still being made. A duplicate charging apparatus for serving two iron-reheating furnaces for skelp production is shortly to be installed. In the same district the Republic Iron & Steel Co. has secured some increase in capacity through the installation of a hot metal route, one and one-half miles in length, from the blast furnaces at Haselton to the Bessemer plant in Youngstown. At Cincinnati the Steel Foundry Co., which began operations some months ago, has one 15-ton and one 25-ton open-hearth furnace in operation. A two-ton Bessemer converter began blowing at Wellsville some time ago, and several other small furnaces have been installed by concerns utilizing the product in their own manufactures.

The steel-making capacity of the state is scheduled for another large increase when improvements now planned for the Newburg plant of the American Steel & Wire Co. are completed. These include the installation early in the coming year of six open-hearth furnaces of fifty to sixty tons capacity each, and it is the intention eventually to increase this number to twelve. The Thomas Construction Co. is to erect a steel plant at Niles, equipping it at first with two 50-ton open-hearth furnaces and operating blooming, billet and bar mills. In the bar iron field, the Empire Rolling Mill at Newburg, near Cleveland, recently completed additions doubling its capacity, and minor additions have been made to a number of other plants.

BIRMINGHAM.

Some New Furnaces and Old Stacks Are Being Rebuilt.

Birmingham, Ala., Nov. 1, 1906.—While many preparations have been underway in this section of the country for some time looking to a larger production of iron and steel, there is no boasting as to a present increase in the output or the probable increase during the next year. The demand has been much greater than the make for the past two or three months and sales have been made covering a large proportion of the probable make for the first six months of the coming year. Three furnaces in this district are now undergoing repairing which give promise of being completed within the next thirty to sixty days. They will be placed in operation immediately after their completion, but it is believed that three of the furnaces now in operation will be blown out for repairs. The Sloss-Sheffield Steel & Iron Co. announces that one of its furnaces will always be out of blast on account of the necessity of repairing from time to time. The Tennessee company will probably continue its idea of rebuilding one furnace, so that when one iron maker is completed another is blown out and a force of men is placed at work rebuilding another one. The Woodward Iron Co. is practically rebuilding one furnace at Woodward, but it will not be ready for the torch until after the turn of the year. The Central Iron Co., the Lacey-Buck Iron Co. (Southern Steel Co.) and the Tennessee company (Bessemer), have added furnaces to those in operation in this district. But one absolutely new furnace is under construction, but there is no telling when it will be completed.

The only work of any consequence planned for construction in the future is the new steel plant of the Tennessee Coal, Iron & Railroad Co. at Ensley. This plant will be completed, it is expected, by the end of the coming year. It will cost more than $1,500,000. The excavations for the foundation are nearing completion. The Birmingham Iron Co. (formerly the Tutweiler Coal, Iron & Railroad Co.) has plans in hand and contracts

ONE COLORADO STACK.

Blast furnace F of the Colorado Fuel & Iron Co. at Pueblo, Colo., which has been under construction for several years, is now being pushed to completion. It will have an annual outturn of 125,000 tons.

PRODUCTION RECORDS BROKEN BY ILLINOIS STEEL CO.

(Continued from Page 1.)

Structural Mill Records.

July 7, 1906, was the date of the last record, 24 hours' operation producing 857 tons; Oct. 11, 899 tons were produced in the same time; Oct. 12, 942 tons, and Oct. 13, 957 tons. The best previous record for a week was made in the week ending Sept. 16, 1906, when 4,221 tons were produced; for the week ending Oct. 13, 5,087 tons were made. The best previous monthly record was July, 1906, with 14,152 tons. In October, 18,269 tons were produced.

Slabbing Mill Records.

In 24 hours, March 31, 1906, 1,190 tons were turned out, establishing a record. Oct. 24, 1,193 tons were turned out. The best previous record for a week was made in the week ending March 5, 1906, when 6,052 tons were produced. In the week ending Oct. 6, 6,400 tons were made. The best previous monthly record was that of January, 1903, when 24,693 tons were made. In October 27,770 tons were produced.

Plate Mill Records.

The last record for 12 hours' operation was made Nov. 16, 1903, when 440 tons were produced. On Oct. 30, 445 tons were made. The last record for 24 hours' operation was made Nov. 16, 1903, when 736 tons were produced. Oct. 18, 751 tons were produced; Oct. 20, 763 tons; Oct. 27, 814 tons, and Oct. 30, 833 tons. The best previous record for a week was made in the week ending March 5, 1906, when 3,604 tons were produced. In the week ending Oct. 20, 3,989 tons were produced and in the week ending Oct. 27, 4,013 tons were made. The last record for one month's operations was March, 1906, when 14,396 tons were produced. In October, 1906, 16,078 tons were turned out.

At the Milwaukee works, the last monthly record for the 8-inch mill was made in April, 1905, 2,172 tons. In October the output from this mill was 2,326 tons. No. 1, 9-inch mill, had a record, established in October, 1902, of 2,845 tons. October, 1906, it turned out 2,850 tons. The 21-inch mill in October, 1905, made a record of 4,677 tons; in October, 1906, it produced 4,736 tons.

The established record output for all the mills was set in March, 1906, with 21,982 tons; in October, 23,018 tons, were produced. The last total bar record was set in March, 1906, 16,354 tons; in October it was 17,113 tons.

New Cement Records.

Cement records were also broken. Plant No. 3, set its last record for 24 hours, Sept. 25, 1906, with 5,110 barrels; Oct. 25, it produced 5,120 barrels; Oct. 27, 5,130 barrels; Oct. 29, 5,180 barrels, and Oct. 30, 5,210 barrels. January, 1906, held the last monthly record in the production of cement, when 138,000 barrels were made. In October this was broken with the production of 145,000 barrels. Plants No. 2 and No. 3 had a record set in June, 1906, of 187,000 barrels; In October 192,000 barrels were produced at these plants.

N. F. A. CONVENTION.

Program Includes Addresses By Notables.—Final Arrangements.

Charles E. Littlefield, of Maine, recently re-elected to congress in the face of a bitter campaign waged by Samuel Gompers, of the American Federation of Labor, and Arthur A. Hamerschlag, director of the Carnegie Institute at Pittsburg, will be the principal speakers at the banquet of the National Founders' Association in connection with its eleventh annual convention to be held at the Hotel Astor, New York, Nov. 14 and 15. The program, as arranged, includes the usual preliminary business, appointment of committees and the hearing of financial reports. The situation in strike centers will be discussed by representatives from affected shops. The report of the special committee on the Winona Training School will give considerable time to the education of apprentices and specialty molders, with ample discussion, and the introduction of molding machines during the recent strike will be carefully reviewed. George H. Monaghan, attorney for the association, is to discuss the subject of "Injunction from a Practical Standpoint," dealing specifically with those conditions justifying an application, with the preparation of evidence and with the decree and what it covers. Other subjects to be considered include the establishment of branch offices of the N. F. A., the adoption of measures favorable to the independent molder and coremaker and the distribution of literature among workmen. This will be followed by the consideration of miscellaneous subjects and the election of officers will close the session. Special railroad rates have been secured and a large attendance is expected.

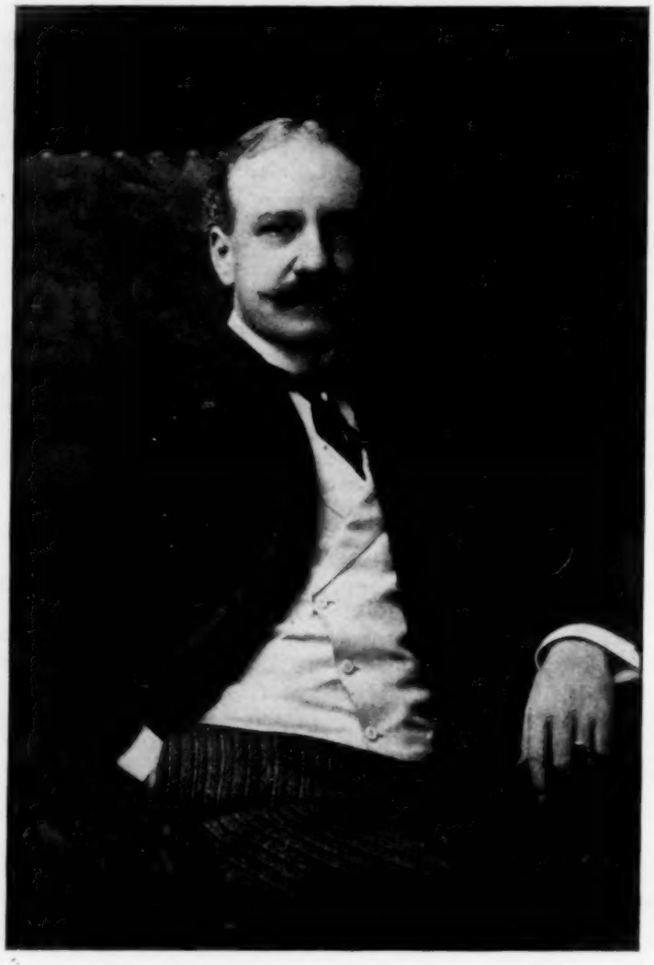
WILLIAM B. EARNSHAW DEAD.

William B. Earnshaw, president of the Dayton Malleable Iron Co., and one of the most prominent men of Dayton, O., both in social and business life, died of heart failure late Wednesday afternoon, Oct. 31, while a guest at the International Hotel, Sault Ste. Marie, Ontario. Mr. Earnshaw was educated in the Dayton schools and at the age of seventeen was graduated from Central high school with high honors. He later completed a course at Miami commercial college and left that institution amply prepared for a successful business career. Soon after graduating, Mr. Earnshaw entered the employ of the Dayton Malleable Iron Co., and was rapidly promoted, first to the position of secretary and later to that of vice president and general manager of the company. In 1902 Robert C. Schenck, president of the company, died and Mr. Earnshaw was elected to the presidency.

PERSONALS.

Park Bentley has been made superintendent of the Lennox Machine Co.'s branch at Minneapolis.

Burt H. Whiteley, president of the Whiteley Malleable Casting Co., Muncie, Ind., sailed for Europe Nov. 2.



William B. Earnshaw.

Clinton E. Hobbs, for the past twenty-four years salesman for Dodge, Haley & Co., and the A. M. Wood Co., Boston, has opened an office at 143 Federal street, of that city, as manufacturers' agent for iron, steel and manufactured products.

Herbert L. Sutton, for the past year acting superintendent at the Bridgeport plant of the American Tube & Stamping Co., has resigned to take service with the Griffin Wheel Co., Chicago. He is succeeded by H. W. Hincks.

James G. Lindsay, of the firm of J. G. Lindsay & Co., well known Philadelphia iron merchants, will be the next president of the Susquehanna Iron Products Co., successor of the Susquehanna Iron & Steel Co. The selection of Mr. Lindsay to head the reorganized interests meets with general approval.

BIDS ON LOOKOUT MOUNTAIN IRON CO. PROPERTIES.

Birmingham, Ala., Nov. 6.—The following made highest bids at the receiver's sale of properties of the Lookout Mountain Iron Co. here this week: Charles M. Stephens, representing First National Bank of Cincinnati, for furnace, coal and ore lands and undeveloped properties, $300,000; same for second hand air compressor, $1,275; same for ore and coal and other raw material ready for shipment, $2,800; same for fixtures and furniture in commissaries, $800. J. V. Robinson, of Chattanooga, Tenn., bid for commissary supplies, $4,550. Total amount of bids, $309,425. The judge of the federal court will have to pass on the offers before they become effective. The Cincinnati bank was greatly interested in the iron company.

BEGINNING OF AMERICAN MALLEABLE IRON.

THE BIRTHPLACE OF A MODERN INDUSTRY.

Early Experiments and Original Patents.

At No. 28 Orange street, Newark, N. J., in a little side street half hidden behind the tumble-down factory where the world's most famous talcum powder is prepared, there is an old foundry which has a history. The story of its earlier years is in fact the history of the beginning of the industry in this country; for it was there that Seth Boyden began casting and annealing buckles and bits for the harness makers some eighty years ago, and it was there that all the early malleable iron founders learned the art of decarbonizing castings. Since the days when the foundry occupied a part of the lot behind Mr. Boyden's home, the business has been carried on under many different names, but it has always held an important place in the trade. Of late years it has grown so much that it is beginning to feel cramped in the original quarters. Before long the historic site must be deserted for new ground where there will be more room.

Very little of the original plant remains. A part of the old wall still does duty at one side of the foundry. In a busy place many changes are inevitable in the course of eight years. The foundry does not present an imposing front. There is the apparent lack of design common to all structures built on the order of growing necessity rather than according to a definite plan, but it is far more extensive than the photograph would lead one to suppose. The ground is crowded with buildings and the yards are narrow. There are many modern features, although a model arrangement for the economic handling of material must wait until the plant can be rebuilt elsewhere.

FIG. 1.—GENERAL VIEW OF THE PRESENT PLANT.

Seth Boyden here began the production of malleable castings in 1826. He continued in the business only nine years, until 1835, when the Boston Malleable Cast Iron & Steel Co. bought him out, and also his brother, Otis Boyden, who in the meantime had started the Crockett foundry, also in Newark. But the early consolidation seems not to have been successful. The Boston company failed two years later, when the foundry passed into the hands of Condit & Bolles, under whose management it continued until 1843. Since then the office stationery has borne the following names: Daniel Condit, 1843-1858; Condit & Barlow, 1858-1862; Condit, Barlow & Shove, 1862-1866; Barlow & Shove, 1866-1870; J. H. Barlow, 1870-1879; J. H. Barlow & Condit, 1879-1882; Barlow, Condit & Morris, 1882-1895; Morris & Barlow, 1895-1899, and from 1899 to the present time that of the present proprietor, Arthur E. Barlow, son of the J. H. Barlow, whose name is prominent from 1858 on.

When the history of the malleable iron industry in this country comes to be written, three names will stand out prominently, all belonging to men who have spent active years in this foundry —Seth Boyden, J. H. Barlow and William G. Morris. Of these, Mr. Barlow held the most modest part, for he devoted his time and energies chiefly to

the office and not to the technical end of the business. William G. Morris practically grew up in the environments of the plant, and later as head of the business was regarded as one of the highest authorities on the founding of light castings, and by many as the very highest in the art of malleable iron making. He was the son of a foundryman, his father having served his apprenticeship under Seth Boyden. He died in 1898 while in attendance at a meeting of the Philadelphia Foundrymen's Association.

Although he spent only a comparatively small part of his extremely active life in the business, still it is Seth Boyden whose memory lends especial interest to the place. It was on this spot that he carried on his laborious experiments extending over a period of six years, and it was here that he laid the foundations of a great American industry. The citizens of Newark think so highly of his labors that his statue occupies the most conspicuous place in the city park, almost within stone's throw of the site of his workshop. He was a remarkable man and probably enjoyed every hour of his long

FIG. 2.—SETH BOYDEN.

life, although he died poor, on a farm presented to him by those who had made fortunes free from the use of his numerous inventions. A list of the industries which profted by his genius would be too long for the present paper. His activities ranged from the manufacture of patent leather to improvements in the culture of strawberries, the last of his enterprises—the Boyden strawberry—is still highly esteemed. He invented a process for the production of Russia sheet iron; built machines for making nails; opened a plant for the manufacture of engines and locomotives; invented the link-motion and a cut-off for steam engines, both of which he neglected to patent. Indeed, he seems to have valued commercial success not at all. As soon as he had brought a machine or a process to mechanical success he seems to have lost interest in it.

FIG. 3.—STATUTE OF SETH BOYDEN, IN NEWARK.

The problem of malleable iron casting occupied Boyden's attention probably longer than any of his other interests. Besides the years spent in experiment he worked nine years managing the growing business. Under his care it grew from a small shop to an establishment employing 60 molders. In 1835 he sold out for $25,000. The notes describing his experiments are, so far as they have been preserved, extremely interesting. They were admirably reviewed and commented upon some years ago by George C. Davis, in a paper read before the Philadelphia Foundrymen's Association.

It is not generally claimed that Boyden actually invented the process of making malleable iron castings, for his notes show that he had specimens of soft iron made in England and he knew the secret of annealing. But his advance information must have been extremely meager; he worked out practically every point in the process by his own experimental studies. The earliest trials were made in his house, the iron being melted in crucibles in a forge fire and the castings annealed in a small furnace erected in the fireplace. In this way he made twelve experiments to determine the quality of pig iron to be used, the best packing, the temperature for annealing, etc. An entry in his notes dated July 4, 1826, under the heading "Experiments in the Foundry," shows that the results had by that time been so satisfactory that he had felt justified in providing a plant.

In 1828 the Franklin Institute, of Philadelphia, offered a silver medal for the best specimen of annealed cast iron to consist of not less than one dozen pieces. The following is from a report of a committee of that year: "Premium No. 4, for the best specimen of annealed cast iron, is awarded to Seth Boyden, of Newark, N. J., for specimen No. 163, being an assortment of buckles, bits and other castings remarkable for their smoothness and malleability. This is the first attempt in this country to anneal cast iron for general purposes that has come under the knowledge of your committee, and the success attending it fully entitles the maker to a silver medal." Boyden had been in the silver plating business, and it was to find a less expensive method of producing harness hardware than by the blacksmith's

FIG. 4.—J. H. BARLOW.

hammer that he first began to study the annealing process. A visitor to the foundry today will find that the manufacture of bits and buckles is still an important industry there.

Some of the early experiments are somewhat amusing when considered by the light of our more extensive knowledge of chemistry and thermal physics. Thus, various substances were added to the molten iron, such as sulphur, phosphorus, tin, zinc, lead, antimony and nickel, which did not improve matters, and additions of this sort were soon abandoned. An entry dated 1832 con-

tains the following in reference to melting on a basic lining: "The more iron is free from carbon, the stronger heat is required to anneal it; lime on bottom in place of sand, iron equally good."

To discover independently the proper method of annealing was no simple matter. The first reference to well annealed castings is dated Oct. 20, 1826: "I have a piece so good it will not harden any more than copper, and when hammered is scarcely inferior to the best wrought iron." At a number of places he speaks of keeping the pots at a temperature to melt silver. He had an ingenious device for awakening him in the night when the furnace needed more fuel. A burning candle impaled on a nail served as an alarm clock. When the candle had been consumed as far as the supporting nail the butt fell by force of gravity, striking a sounding piece of metal in its fall.

Naturally, there were many failures. For packing, various kinds of native ore were used, also Spanish brown hematite, manganese ore, sand, clay, lime, ashes, hammer scale and many mixtures, including saltpeter, alum, sal-ammoniac and plaster of paris. Under date of April 3, 1827, he writes: "The conclusion is that red oxide of iron is important and in fact the best thing known for packing, and Sterling, well refined, the best iron." The Sterling iron was obtained from the Sterling Iron Works, in Orange county, New York, near the present Tuxedo.

Once established on a practical footing, the business grew rapidly, soon requiring the services of 60 molders. At first the iron was melted in crucibles heated with charcoal or hard coal, and lime was the usual flux, although many other substances were also tried. Soon an air furnace was built having a capacity of about a thousand pounds. The fuel was dry pine wood or coal, and it is said that eight heats a day were made, beginning at three in the morning and continuing until late at night. The furnace was not tapped, the iron was removed by dipping with clay-washed ladles holding from 10 to 12 pounds each.

A mixture of coal and rosin known as "patent fuel" was used in 1831, rosin being at that time very cheap. There is in the library of Newark the original patent granted to Seth Boyden, and signed by Andrew Jackson, for a mixture of this kind, the claim being, however, for an improvement in the manufacture of malleable cast iron. The following is a copy of the essential portions of the document:

THE UNITED STATES OF AMERICA.

To all to whom these LETTERS PATENT shall come:

WHEREAS, Seth Boyden, a citizen of the United States, hath alleged that he has invented a new and useful improvement in the manufacture of malleable cast iron, which improvement he states has not been known or used before his application; hath made oath that he does verily believe that he is the true inventor or discoverer of the said improvement; hath paid into the Treasury of the United States the sum of thirty dollars; delivered a receipt for the same, and presented a petition to the secretary of state, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose: THESE ARE THEREFORE to grant, according to law, to the said Seth Boyden, his heirs, administrators or assigns, for the term of fourteen years, from the ninth day of March one thousand eight hundred and thirty-one, the full and exclusive right and liberty of making, constructing, using and vending to others to be used, the said improvement; a description whereof is given in the words of

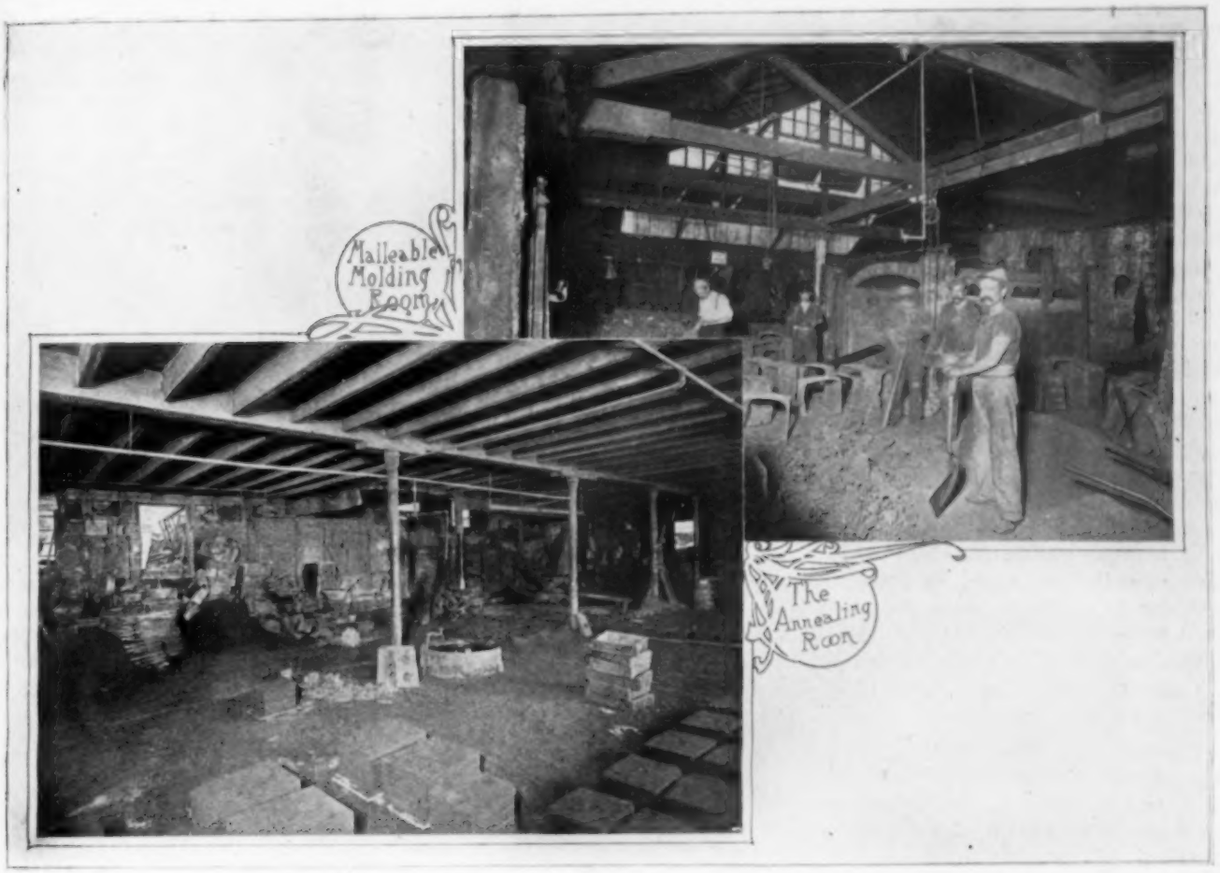


FIG. 5.—TWO VIEWS IN THE PRESENT PLANT.

the said Seth Boyden, himself, in the schedule hereto annexed, and is made a part of these presents.

IN TESTIMONY WHEREOF, I have caused these Letters to be made Patent, and the Seal of the United States to be hereunto affixed.

GIVEN under my hand at the city of Washington, this ninth day of March, in the year of our Lord one thousand eight hundred and thirty-one and of the independence of the United States of America fifty-fifth.

ANDREW JACKSON.

By the President,
M. VAN BUREN,
Secretary of State.

The schedule referred to in these letters patent, and making part of the same, contains a description in the words of the said Seth Boyden himself, of his improvement in manufacturing malleable cast iron.

The improvement consists in mixing rosin, pitch, or tar, with bituminous coal, and applying it as fuel for melting and converting crude or pig iron to malleable castings—the coal is pulverized or broken in pieces of a size suited to the furnace grate, and mixed with rosin, pitch or tar, in a proportion as the intensive heat is desired, and applied in quantities diminishing in proportion as the rosin is increased.

In testimony whereof, I have hereunto subscribed my name, this twenty-first day of February, one thousand eight hundred and thirty-one.

Witnesses: SETH BOYDEN.
JAMES NUTTMAN.
D. D. CRANE.

The first cupola was built in 1832. It was of the solid bottom type and used hard coal as fuel. It was a straight shaft, the upper portion of which could be lifted off for cleaning and repairs after every heat. A flaring draft stack surrounded the shaft. An archway gave entrance to the charging platform, there being ample room between the stack and shaft for the men to work. A heat could be run only every other day, the intervening time being necessary to clean out the slag and cinders.

Patterns were usually made from white metal, but iron, brass and wooden patterns were also employed. Fewer pieces were molded on one gate than at present. For one-inch buckles from four to eight were placed on a gate, but several gates were molded in one flask. The flasks were circular and made of sheet iron. The castings were cleaned in a wooden keg strengthened with iron hoops. A door at the side, iron gudgeons at the ends and holes bored to let out the sand and the tumbler was complete. Power was applied by means of a belt over the center of the keg.

Molding sand was obtained from a bank between Newark and Elizabeth. Rockaway, Long Island, furnished core sand, and the binding material was usually wheat or rye flour.

The first annealing pots were of the beehive shape, the pots being inserted from the top. A cover could be removed by means of a crane. The pots were packed in mill scale and kept at an annealing temperature for a week. An improvement upon this type was later introduced in the form of a "shove furnace," which was operated continuously by introducing the pots at one side and gradually "shoving" them through to the other. The floor was inclined to facilitate the "shoving." The furnace held 48 pots, about 10 x 12 inches, and was closed with large bungs luted at the joints. The fire-boxes were at the side, with inlet ports near the top of the furnace. The flame passed to the upper end and then to flues below which led to a stack near the lower end. The fuel was pine wood, charcoal or soft coal.

In the early days a surprising variety of castings was made. There is a small catalog extant which states that more than 1,000 different articles were made. The prices obtained at first were about 25 cents a pound, and gradually fell to eight cents a pound in 1854. During the civil war they rose somewhat. For some time the demand for castings was almost purely local, but Boyden early managed to get foreign trade, exporting bits and other articles to Spain. The blacksmiths naturally objected to the new-fangled material and feared that it would ruin their business.

From this first malleable iron works the industry soon spread to all parts of the country. Newark became a center for annealing castings, there being at one time as many as eight foundries in operation. One of the Boyden brothers, Alex., carried the art to Boston in 1837, and a malleable iron foundry was established in Cincinnati, Ohio, as early as 1850.

The writer of this article wishes to acknowledge his indebtedness to Arthur E. Barlow, the present proprietor of this interesting foundry, and to George C. Davis, whose compilation from Seth Boyden's notes has been drawn upon freely.

The stimulating effect of railroads on iron production is shown by the fact that in 1830, when England's first railroad was built, the pig iron production of that country was 677,417 tons. In 1840 the production had risen to 1,396,400 tons.

OPEN HEARTH STEEL CASTINGS.—X.

Cracks in Steel Castings.

BY W. M. CARR.

One of the most common sources of weakness in steel castings is the liability to crack in the mold. The condition is the result of "red-shortness." It is is an annoyance and a continual point of contention between the melter and the molder, each blaming the other for his share in the cause, the molder claiming the steel as it leaves the furnace is not just what it should be and the melter saying that the metal is faultily cast in the desired forms without any consideration as to the proper distribution of metal in the light and heavy sections of a casting. From the standpoint of the metallurgist the melter is at times to blame and at other times the molder, or, going further, the engineer who submits the designs to be cast.

The condition of "red-shortness" or cracks is far from obliging and may present itself at the most unexpected and inopportune times. If in a given heat of steel there should be found a number of discards among various designs because of cracks and the trouble continue for a long period, it is safe to say that the metal is not receiving the proper treatment in the furnace. If cracks appear only in one design in a given heat of steel among other and different designs, the trouble is safely due to some fault either in a molding detail or the lines of the casting. In other words a few discards in keeping with an average loss of bad castings cannot be blamed upon the metal.

As discussed in previous sections, if "red-shortness" is troublesome attempts are frequently made to reach a lower sulphur analysis, but not with success. It has been thought that in doing so the trouble might abate, because the element sulphur is given the credit for "red-short" effects and that a correction could only be found in the composition. If cracks are numerous the cause is mainly due to the flame character in melting and the way the refining is conducted. Through such conditions the metal becomes contaminated with an oxide of iron that acts in a measure precisely the same as sulphur is said to do, and what may seem strange, also, is that it is possible to deoxidize the metal to the extent that blow-holes caused by gaseous steel are practically absent, yet "red-shortness" will still be causing trouble. Numerous instances have been observed in practice which point to the fact that there must be an indefinable form of oxide (iron) that does not submit to the cleansing action of silicon and man-

case as soon as the furnace manipulation could be brought under control a ganese as final additions. In such a very serious campaign of cracked castings was stopped without any change in design of castings, methods of molding or analysis of finished product. There could be noticed also a change in the fracture of the metal in regard to the appearance of the crystals, another evidence which could be traced back to furnace manipulation, and it in a great measure is responsible for "red-shortness" in castings, independently of the amount of sulphur initially or finally.

In regard to molding conditions and their influence upon cracks the trouble often lies in several directions. Steel in cooling contracts much more than gray-iron cast from a similar temperature. There is a point where the steel has lost its fluidity and is more or less viscous, but is without stability and will crumble under pressure. When the steel passes to a lower temperature it seems to increase in density and becomes more or less malleable. At the viscous point should there be any resistance offered to the metal while cooling and contracting, because of improper distribution of metal or absence of fillets at angles, or of a flask bar, hard core, core arbor or hard molding sand, there is danger of a separation or a crack (a crumbling of the metal) at that point where the contractive force could not overcome the resistance of the obstacles mentioned. Should the metal be "over-oxidized" at the range of temperature where viscosity is manifest, the liability to crumble is aggravated and the castings will crack with very slight resistance from the causes mentioned.

It is not to be supposed that should the metal be absolutely free from oxide it will not crack even under extreme resistance of mold parts. The conditions of crumbling under slight pressure at a high heat, near the melting point, are peculiar to all carbon steels, therefore if the steel were ever so pure it would crack if held rigidly while cooling and contracting.

Let the metal be poorly handled in the furnace and many cracks will appear in spite of care on the part of the molder. If, however, due care is observed in the position of the gate to allow a uniform cooling of the metal in the mold, cores made of such a mixture that under the heat of the liquid metal they will crumble to dust or non-resisting masses, ample sand space between flasks, bars and projections on castings, provided molding sand of such a texture that when subjected to a high temperature it will become non-resistant, used, then, with good metal, cracked castings need not cause much worry by a low yield of salable product.

A NEW RECORDING PYROMETER.

In this era of rapid technical progress in all industrial and manufacturing establishments where high temperatures are employed, there is an increasing demand for instruments to automatically and accurately record every change that occurs. Records obtained from such apparatus make it possible to control the temperatures, so that the product is perfectly uniform and most economically produced. The accompanying illustrations show a recording pyrometer of the thermo-electric type, which is capable of application to almost every commercial and industrial requirement. It has been devised by William H. Bristol, 45 Vesey street, New York, and the indicating type of the same instrument was described in THE IRON TRADE REVIEW of May 17, 1906.

The complete instrument consists of three distinct parts, namely: The recorder, which is located at the point most convenient for observation of the records and for changing of the charts; the thermo-electric couple, the fire-end of which is to be inserted into the space where the temperature is to be measured; the leads consisting of duplex flexible cable for making the electric connection between the recorder and the fire-ends. An exterior view of the instrument is shown in Fig. 1.

The thermo-electric couple, which is located where the temperature is to be measured produces a current of electricity, which is communicated to the recorder through the connecting leads. This current actuates a galvanometer movement, which is contained in a dust proof metal case, shown in the upper portion of Fig. 2. The galvanometer movement is made according to a special design by the Weston Electric Instrument Co. with pivot and jewel bearings for the moving coil. It is "dead beat" in its action.

FIG. 1.—WM. H. BRISTOL RECORDING PYROMETER.

The recorder arm moves free and clear just in front of a chart, which is revolved by a clock movement once in every 24 hours, or at any other desired rate. These charts are prepared with a semi-transparent smoked surface, which is so sensitive that a record may be made upon it with a hair. When applied to the instrument, as shown in Fig. 2, the chart is supported only over a portion of its surface by a semi-circular plate, shown in the lower portion of Fig. 3. The clock movement for revolving the chart is contained in the round case behind the semi-circular chart support, and

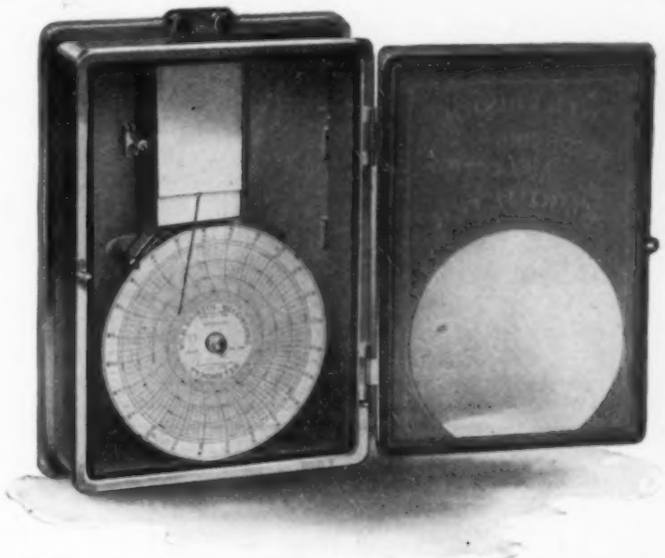


FIG. 2.—INTERIOR OF WM. H. BRISTOL RECORDING PYROMETER.

is provided with an auxiliary attachment for periodically vibrating the unsupported portion of the chart, thus bringing the smoked surface into contact with the pointed end of the recorder arm at intervals of a few seconds. By this means, the record of these pyrometers. It is interesting to note the constancy of the temperature during the period of nearly half an hour, while at night the metal was cooling and passing from the molten to the solid state. The simplicity of construction insures durability and ranges above 2,000 degrees Fahr., the standard Le Chatelier platinum-rhodium elements are used. Compound couples, as illustrated in Fig. 5, may be used to reduce the high cost of the platinum-rhodium element. The inexpensive alloys employed for the ex-

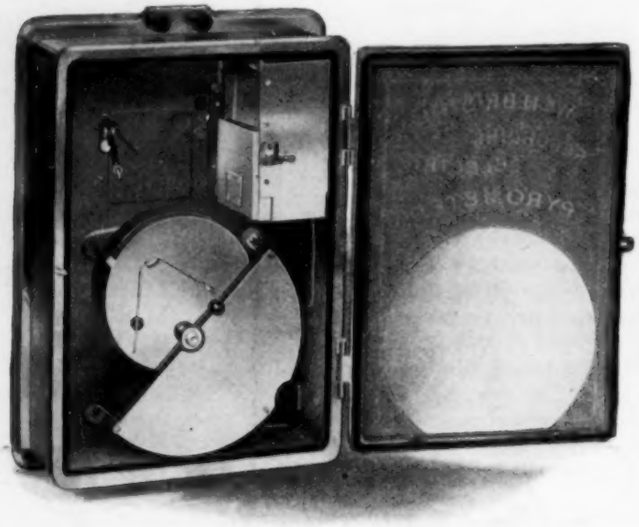


FIG. 3.—OPERATING MECHANISM OF WM. H. BRISTOL RECORDING PYROMETER.

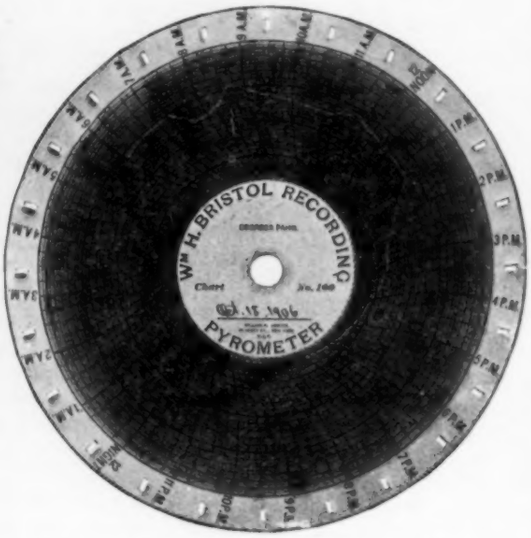


FIG. 4.—CHART OF WM. H. BRISTOL RECORDING PYROMETER.

its position is obtained and friction is eliminated.

The series of marks made by this periodic contact of the recorder arm, which removes the carbon from the chart, forms a continuous curve, unless the changes in temperatures are extremely rapid. After the record of the day is completed the chart may be removed from the instrument and "fixed' by immersion in a fixitive solution, which consists of gasoline or alcohol, to which has been added a small amount of concentrated fixitive. After fixing, the charts may be handled and filed without any danger of destroying the record.

Fig. 4 is a reduced photographic reproduction of a smoked chart, with a record of the temperature in the lead bath, which is used for calibrating permanent accuracy and makes the operation of the instrument an easy matter. The protecting case containing the galvanometer is hinged to the back of the recorder, and in Fig. 3 is shown turned to one side. This arrangement prevents injury to the recorder arm, while the charts are being changed or the clock wound.

It should be mentioned that the coating of lamp black on the charts is not sufficient to obscure the graduations, and the edges and center are unsmoked. The charts can, therefore, be conveniently handled and packed for shipment. The couples employed for ranges not exceeding 2000 degrees Fahr. are made of special alloys, which are inexpensive, and may be of almost any desired form or length to suit the special requirements. For

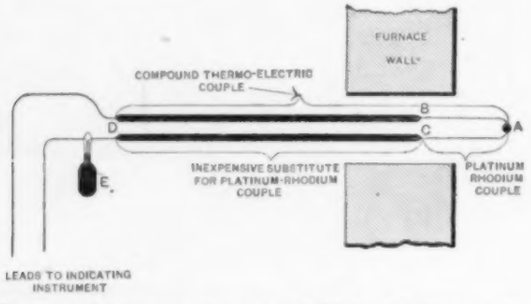


FIG. 5.—COMPOUND COUPLE FOR HIGH TEMPERATURES.

tension of the couple are such that the two secondary thermo-electric effects at the junctions with the platinum and platinum-rhodium elements neutralize each other if the temperature at these junctions does not exceed 1,200 degrees Fahr. The indications on the instrument will be the same as if the whole couple had been made of the more expensive metals. Where there are varying temperatures at the cold end of the couple, a mercury compensator is used, which automatically changes the resistance of the circuit, so that no correction is necessary for the working range of the instrument.

Worcester Polytechnic Institute began the current scholastic year with the largest freshman class and the largest total registration in its history. The total number who have enrolled in the freshman class is 167, and the total enrollment for the Institute as a whole is 438. This is an increase of about ten per cent over the numbers cataloged last year.

Rapid progress is being made on the new electrical engineering laboratory, and although the contractors have been seriously hampered through inability to obtain a sufficient number of men, it is hoped that the building will be enclosed by the time cold weather begins.

PIKE MINE LEASED.

By the Brotherton Iron Mining Co.—Old Range Developments.

(Special Correspondence.)

Norway, Mich., Oct. 30.—The Brotherton Iron Mining Co. has leased the Pike mine, owned and opened and wrought by Captain R. D. Pike of Ashland, and associates. This property lies in Section 9, Town 47-45, north of Sunday lake, and adjoins the Brotherton and Chicago tracts, the latter on the east. There are two shafts, the newer and active one close to the Brotherton mine. This shaft, 10 by 6 feet in dimensions and two compartments in size, is down 960 feet. The equipment includes hoists, pumps, a six-drill capacity compressor and work shops. The mine had been well managed and economically operated. The Pike has never been a large producer, but during the past year it has been prepared for larger results and will henceforth give a better account of itself. The ore is of excellent grade, apparently a combination of the Brotherton deposit, and there appears to be considerable of it. The first production was made in 1900, and up to the opening of the present season about 27,400 tons had been shipped. The new operators have reopened the old shaft, at the west end of the mine, and with necessary repairs completed, this portion of the property will be thoroughly explored while mining operations are continued in the ground tributary to the present active shaft.

The Barasa Tract.

In view of the past efforts to develop a mine on the Barasa tract, at Negaunee, Marquette range, much interest has been aroused by the fact that Louis Neuberger, in association with Wm. A. Paine, of Boston, has taken an option on the property and has already started systematic exploratory work. The Barasa lies just northeast of the Cleveland-Cliffs company's big Negaunee mine, from which two and three-quarters million tons of ore have been shipped and which still has a long lease of life before it, yet despite many years' work, more or less intermittent, the property is still to be brought to the producing stage. It has been in the hands of a number of concerns, and in addition its owners, who are not millionaires, have expended about all the money they could conveniently furnish, persisting in the face of discouragements, geological as well as financial, that might well have appalled the most courageous. Work was first started in 1893. Ore had previously been located by diamond drilling, but because of a heavy overburden of wet sand the initial attempt to sink down to the deposit resulted in failure and it was necessary to put down a shaft in the slates to the northward. Thereafter the efforts were concentrated in a search for the main ore body. Many thousands of dollars were poured into the property over a period of years. Fine ore was found, but apparently not enough of it, for the fact remains that as yet no mine has been developed. Now, the new option-holders have started to give the Barasa a thorough test with diamond drills, and it is excellent opinion that the work will be crowned with success, and that, as at the new Cleveland-Cliffs company's Maas mine, in the same vicinity, important ore bodies will be found at depth. The fact that a man so well informed in regard to the mining business in its general phases as W. A. Paine, banker and broker of Boston and president of the Copper Range Consolidated Copper Co., operating the big South Range properties in Houghton county, has seen fit to become interested in the enterprise is regarded as a happy augury. It will surprise Marquette range mining men if ore in sufficient quantity to warrant developing the property is not found.

Corrigan-McKinney Operations.

Rivaling Pickands, Mather & Co. and the Cleveland-Cliffs Iron Co., among the so-called independent ore producing interests, are Corrigan, McKinney & Co., who, during the past year or more, have taken over control of a considerable number of new and undeveloped properties in the Iron county (Mich.) fields, and enough is known concerning the result of exploratory work already undertaken to hazard the prediction that at least some of these tracts will develop into profitable mines. Oglebay, Norton & Co., are also branching out, especially on the Menominee, but also on the Marquette range. In this latter field this firm has had for several months past a diamond drill in operation on the Hungerford property, at Humbolt, and the mineral tract near Michigamme, western Marquette range, is also under control of the concern. Lately, by the purchase of the holdings of John T. and Albert G. Jones, of Iron Mountain, Oglebay, Norton & Co. have become an owner of the new Empire mine in the Cascade district, south of Negaunee, to the extent of a one-third interest. The majority interest is retained by the Northern Iron Co., a Chicago corporation, of which Adolph Kurtz, Chicago, is secretary.

The Empire was opened under the direction of A. G. Jones some months ago, since which time much machinery has been installed and considerable development work has been done on surface and underground. The ore is capped by an overburden of only a few feet in places. It is possible, thus, to conduct mining on the open pit plan if desired, but it is the intention of the management to win the greater part of the ore lying near surface by the milling system, because of the nature of the product. Additional stripping will be done this fall, a contract having been awarded for the removal of 25,000 cubic yards of surface material, none of which is deeper than six or seven feet, and this work is now in progress. Next season the Empire will be in condition to produce 250,000 to 300,000 tons of ore. A crusher plant, the foundation of which is completed, is to be installed the coming winter. The machinery has been ready for shipment for some time, but it cannot be delivered at the mine until the Chicago & Northwestern Railway Co. completes its spur, which has been under construction since the middle of the summer. The only work to be done before trains can be run over the spur is the completion of a large bridge, which is now being given the finishing touches. The ore produced at the Empire averages a little better than 44 per cent in iron. It is of a desirable quality despite its low grade, serving well as a mixture with ores containing a higher percentage of iron, and there is a very large deposit of it. The present working force, aside from the stripping crew, numbers forty-five men, and next spring this force will be doubled.

Operations at the Calumet.

In section 8, Town 41-28, three miles south of Felch, in the Metropolitan district, an outlying spur of the Menominee, is located the old Calumet mine, a property which Pickands, Mather & Co., operating under the name of the Calumet Exploration Co. are reopening after an idleness of many years. The mine was opened in 1882 and was closed two seasons later. The Hecla was exploited about the same time, but neither the Calumet nor the Hecla succeeded in rivaling its famous namesake of the copper country, the Calumet having produced 38,713 tons of ore all told, while its twin fell by the wayside and never became a producer. Pickands, Mather & Co. now are employing sixty men at the Calumet. The daily output is about 150 tons and it is expected that 18,000 tons will be hoisted and shipped this season. It is the intention of the company to operate the mine this winter and it is estimated that 15,000 tons of iron ore will be stocked, if a sufficient number of men can be secured to do the work. No. 1 shaft is down 100 feet and No. 2 about 150 feet. The latter shaft will be sunk another 100 feet during the winter. The buildings at the mine consist of two shaft houses, boiler house, engine house, blacksmith and carpenter shop, dry house, two large boarding houses and six dwellings.

APPLICATIONS OF ELECTRICITY IN STEEL WORKS.

Under the above title, *The Iron and Coal Trades Review* published an article which dealt with one of the latest developments in the manufacture of steel. This article is largely reproduced below.

In dealing with this subject, it is not proposed to take up, at any length, generating stations or other features of electric equipment, which are common to nearly all installations.

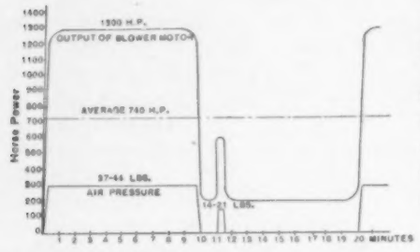


FIG. 1.—PRESSURE AND LOAD DIAGRAM OF A BESSEMER BLOWER.

Bessemer Blowers.

Starting with Bessemer steel works, it may be remarked that electric motors have been used to a considerable extent for tipping Bessemer converters. The problem presents no special constructional difficulties, and standard motors and controlling apparatus are adaptable for this purpose.

For driving blowers for Bessemer converters, the conditions under which an electric motor works are much more interesting, and are shown by the diagram, Fig. 1. During the main blow, it will be noticed that the motor has to deliver about 1,300 horsepower, this power falling off prior to the after-blow, and a long period then succeeding, during which the converter is being recharged, and the motor runs at light load. The average power required throughout the entire cycle is about 740 horsepower. Various methods have been employed for regulating the pressure of the blast, some of which involve variable speed motors.

The application of motors to charging machines, ladle cranes and ingot cranes has been unusual for many years. In most cases, standard crane type motors and controlling gear may be adapted for this purpose. Precaution must be taken, however, that the motors are of ample dimensions, and are protected against excessive heating, such as would be caused by direct radiation from molten metal.

Roll Driving.

There is probably no class of service, in which electric motors are subject to more severe strains, than in the driving of live rolls. For reducing the severity of such shocks upon the motor, fast and loose belts have sometimes been employed. Another method is to use a set of reversing gears and friction clutches, which allow the motor to run continuously in one direction. With both of these plans, however, the parts are liable to rapid wear and the cost of upkeep is high. By far the most usual practice at present is to gear the motors direct to the rolls, making the motor so substantial in construction, and designing it with such high overload capacities from the commutation standpoint, that it will withstand successfully a reversal of current at full speed, the torque exerted by the reverse current being used for bringing the rolls to rest. This method is much the simplest and most convenient mechanically, as it affords a means of starting and reversing the rolls in a minimum of time, and with a properly designed motor and controller, the results obtained by it are excellent.

For meeting such heavy duties, standard motors are not suitable, and special motors are required. The shaft at the bearing end of the motor should be supported in the most rigid manner, and the metal forming the bearing casing carried as directly as possible to the supporting feet, thus avoiding overhang and the possibility of chattering due to the heavy intermittent strains which come upon the motor pinion.

Scarcely less arduous is the service which falls upon the controllers, and for such work standard or tram type controllers are more or less unsuitable. A type of controller, by Siemens, which has given good results in practice, consists essentially of a marble panel, upon which are mounted heavy contact blocks. The current is controlled by contact fingers, with massive cabron tips, the motion of the fingers being obtained by means of a cam shaft with handle or hand wheel. The controllers also have magnetic blow-outs, and the resistances may be arranged self-contained with the controller, or placed in separate frames in any other suitable position.

Three-phase and continuous current types, may be arranged for driving main non-reversing rolls. The type of motor direct-coupled to the rolls is one of massive construction, especially the arrangement of the bearings and base plates, which are designed specially for withstanding the heavy strains which are met with in such drives. For large motors of the three-phase type, Messrs. Siemens have designed a special starter known as the hot water type, which consists of a

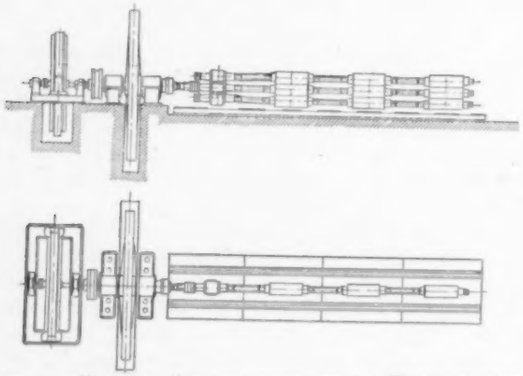


FIG. 2.—GENERAL ARRANGEMENT OF AN ELECTRICALLY-DRIVEN BAR MILL AT THE GUTEHOFFRUNGSHUTTE, OBERHAUSEN, THE MOTOR HAVING A MAXIMUM HORSEPOWER OF 1,800.

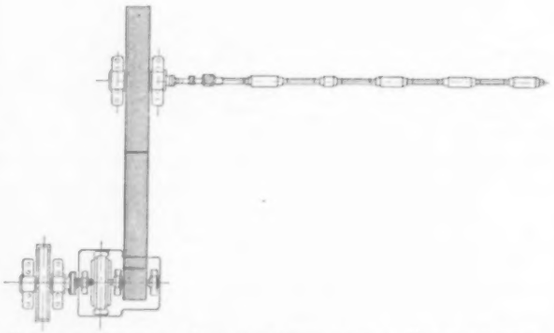


FIG. 3.—GENERAL ARRANGEMENT OF AN ELECTRICALLY-DRIVEN PLATE MILL AT THE FRIEDENSHUTTE MORGENROTH, EAST SILESIA, THE MOTOR HAVING A MAXIMUM HORSEPOWER OF 1,800.

series of contact plates suspended in a tank. By means of a small motor-driven circulating pump, water is made to rise or fall in the tank and submerge the contact plates to any required depth. The water when it comes into contact with the plates boils at the surface and gives off a small quantity of steam which escapes through an outlet pipe. By thus taking advantage of the great latent heat of steam, a starter of moderate size and cost can be produced capable of carrying very heavy currents. These starters have been used with the greatest success for main roll motors of large size. Drawings showing various typical arrangements of motor drives for non-reversing main rolls are given in Fig 2, 3, 4, and 5.

Equalization of Power.

Usually in steel works, motors have an intermittent load with periods in which the motor is either standing or running light and drawing only a small amount of current. For the smaller motors about the works, the variation in power required does not react unfavorably on the generating station, since the variations of a large number of motors tend to neutralize one another. In the case of large motors for driving main rolls, it is frequently desirable to screen the power station from the excessive peak loads of these large motors.

The most obvious method of doing this is to provide a fly-wheel on the rolls or motor shaft of sufficient weight for providing, without an excessive reduction in speed, the excess power required at each pass, the fly-wheel being restored to full speed between the passes. In adopting this plan care must be taken to design the motor and its control gear, so as to permit of a drop in speed without a corresponding rise in current demand, and thus enable the stored energy of the fly-wheel to be utilized. The practical method of accomplishing this in the case of continuous current motors is to provide a compound field winding and with induction motors to insert a fixed or a varying resistance in the rotor circuit, so as to increase the slip of the motor during the period of heavy load. The effects of inserting a resistance in the motor circuit and of employing a fly-wheel are shown by the diagrams of Fig. 6.

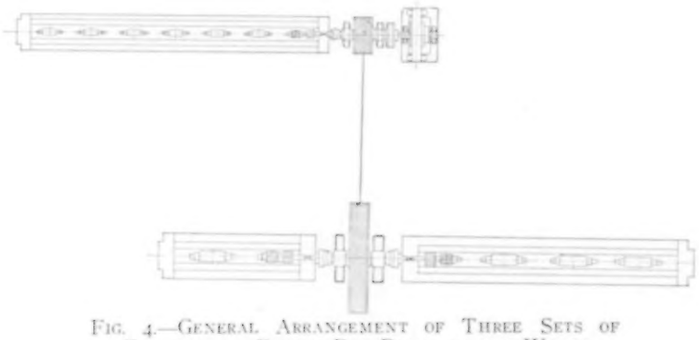


FIG. 4.—GENERAL ARRANGEMENT OF THREE SETS OF ELECTRICALLY-DRIVEN BAR ROLLS AT THE WORKS OF PIETRO MARIO CERETTI, VILLA DOSOLA, ITALY, THE MOTOR HAVING A MAXIMUM HORSEPOWER OF 400.

The first diagram shows the variation in current demand of the three-phase motor shown in Fig. 3, in which for purposes of experiment the fly-wheel was uncoupled and the slip resistance in circuit with the motor disconnected. The second diagram shows the same motor with the fly-wheel coupled and slip resistance connected in circuit.

The third diagram shows the same motor with the resistance still in circuit, but with another train of rolls similar to that shown in Fig. 3, connected on the oposite side of the large

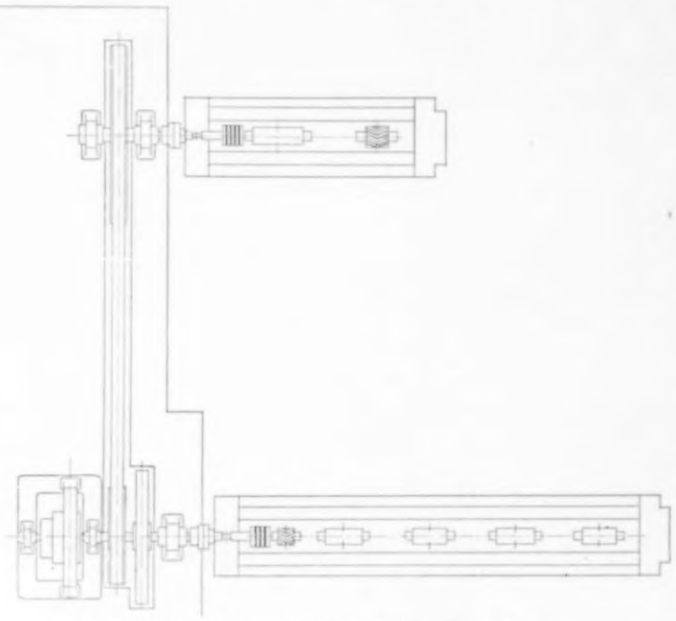


FIG. 5.—GENERAL ARRANGEMENT OF TWO SETS OF ELECTRICALLY-DRIVEN BAR ROLLS, THE MOTOR HAVING A MAXIMUM HORSEPOWER OF 600.

rope pulley, and an increased weight of flywheel. It is interesting to note the uniform appearance of this diagram, as compared with the very irregular current consumption shown by the first diagram.

In order to secure the best results under this plan, it is necessary to construct first, with as much accuracy as possible, a load diagram representing the heaviest duty of the mill, and showing the times required for the passes and intervals, and the power at each instant. An integration of the area of this load diagram will then give the average power to be supplied by the motor The motor should then be chosen to meet this power, but with ample overload capacity, and the fly-wheel proportioned, so that by a permissible reduction in speed, it will provide an amount of power at each pass equivalent to the correspondent load peak above the average.

When it is applicable, the plan described above is the simplest which can be adopted. There are cases, however, in which the peak loads are either so high, or of such long duration that, in order to completely neutralize them, by means of a fly-wheel direct-coupled to the motor or rolls, the weight of the fly-wheel required would be impracticable.

In such cases the excess demand on the generating station may be supplied by a storage battery; but the first cost of a storage battery is high, and also its cost of upkeep, and this has led engineers to search for some simpler means of accomplishing the same purpose.

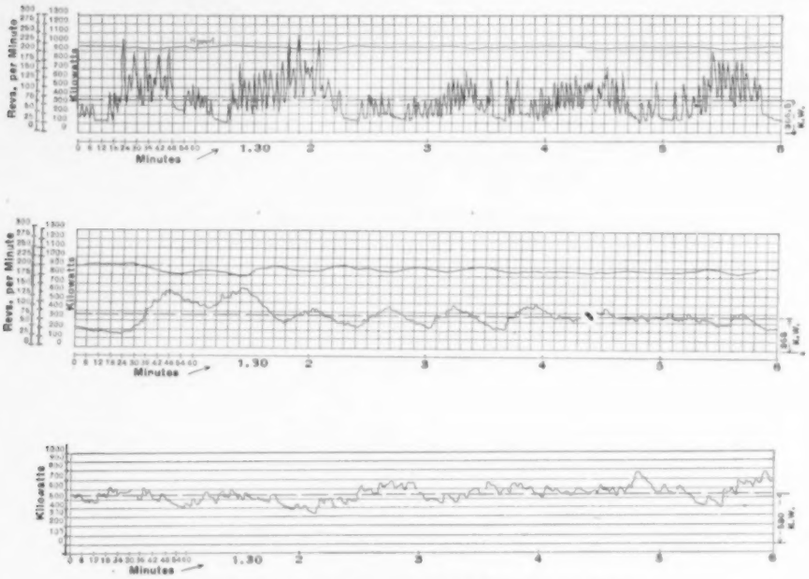


FIG. 6.—DIAGRAM ILLUSTRATING THE EFFECT OF EQUALIZATION OF LOAD BY MEANS OF A FLY-WHEEL AND SLIP RESISTANCE.

Such is illustrated in Fig. 7. This indicates two main roll motors, whose power is equalized by a fly-wheel motor-generator set. The three-phase motor of the motor-generator set draws from the generating station an approximately uniform current, which is equal to the average of the currents required by the main roll motors. The variations in power are neutralized by the fly-wheel in a manner similar to that already described in the case of the fly-wheel direct-coupled to the rolls; but by coupling it to the motor generator, it is possible to run the fly-wheel at a much higher speed, and, therefore, with the same weight of wheel, to store a far greater amount of energy.

A better but slightly more costly arrangement is to have a separate generator on the motor-generator set for each main roll motor. In the case shown, there would then be two generators instead of one. When this is done, a simple means is also afforded for varying the speed of either main roll motor by changing the field strength of its corresponding generator.

By means of continuous indicator diagrams taken from reversing mill engines, the load requirements may be analyzed.

Fig. 8 shows a set of curves plotted, as the result of a series of tests, showing the total work required for elongating billets weighing 2.2 tons to different amounts. The curves are interesting, as showing the relative powers required at the different stages of elongation. The absolute powers required, however, vary greatly with the temperature of the billet.

In order to study the problem of electric driving for main reversing rolls, it is convenient to plot the powers required in the various stages of rolling, as shown in Fig. 9. The powers required for rolling out a four-ton billet are there shown. The diagram is a simplified and more convenient representation of the powers shown by a continuous indicator diagram. During the initial stages, when the billet is short, the loads are heavier and their duration shorter. The powers then gradually decrease, and the length of time during which the power is applied increases as the billet elongates, until finally we have the long, low diagram of the last passes. The integration of these areas is shown by the average power line.

In considering the design of an electric drive for such a mill, very heavy powers are involved. To be successful, a method must be found which will obviate the necessity of handling directly the enormous currents corresponding to such powers, and the method must also be one which will screen the generating station from the

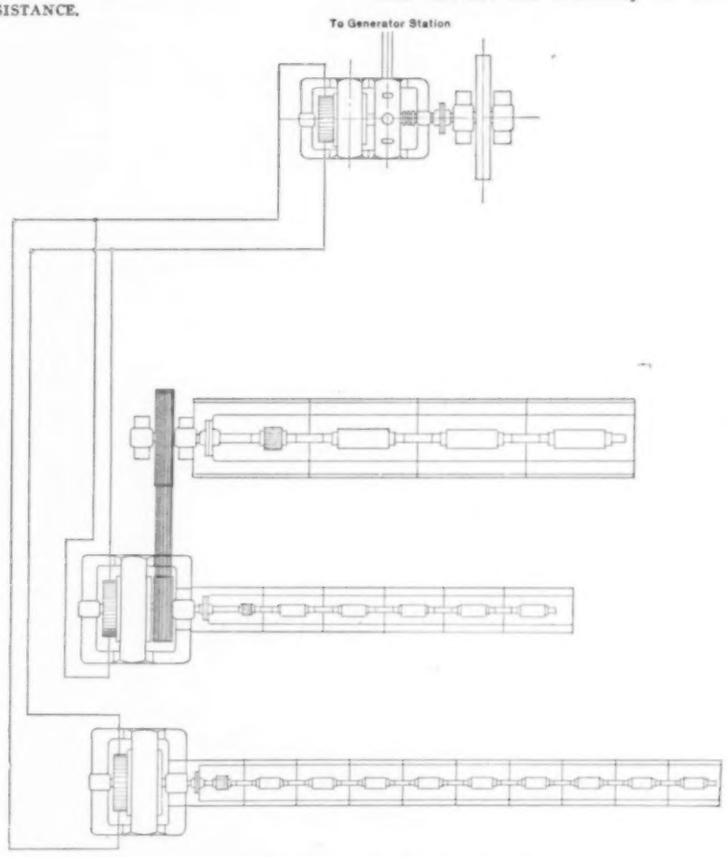


FIG. 7.—DIAGRAM ILLUSTRATING METHOD OF EQUALIZATION OF POWER BY MEANS OF A FLY-WHEEL CONVERTER.

enormous fluctuations in the load demand throughout the process of rolling. A method which accomplishes both of these results is shown diagrammatically by Fig. 10. The mains from the generating station are led to the motor of a fly-wheel motor-generator set. The generator of this set delivers continuous current to the motor, driving the mill, the armatures of the generator and mill motor being connected in series. The field of the mill motor is separately excited, the exciting current for this purpose being obtained from a small auxiliary generator shown in the diagram direct-coupled to the motor-generator set, but where the main supply is continuous current, this auxiliary machine can be dispensed with. The field of the generator of the motor-generator set is controlled from zero to a maximum positive or negative, by means of a rheostat placed on the operator's bridge. By moving the rheostat lever, the field of the generator is thus varied, and the speed and direction of rotation of the mill motor are controlled. The system involves the handling only of the small exciting current required for the generator field. The fly-wheel is proportioned, so that by a reduction of about 15 per cent in speed, it is capable of supplying energy equivalent to the load peaks above the average power line. The speed of the mill motor corresponds to the position of the control lever, and its direction of motion also follows the position of this lever. This metrod of control is known as the Siemens-Ilgner system.

The system has the great advantage that its efficiency remains practically constant at all speeds, and that the power required for accelerating the masses at the beginning of eacl pass is regained and stored in the fly-wheel when the masses are brought to rest for the reverse pass. The generating station, therefore, generates an amount of power corresponding to the average required at a uniform rate, and therefore works under the most efficient conditions.

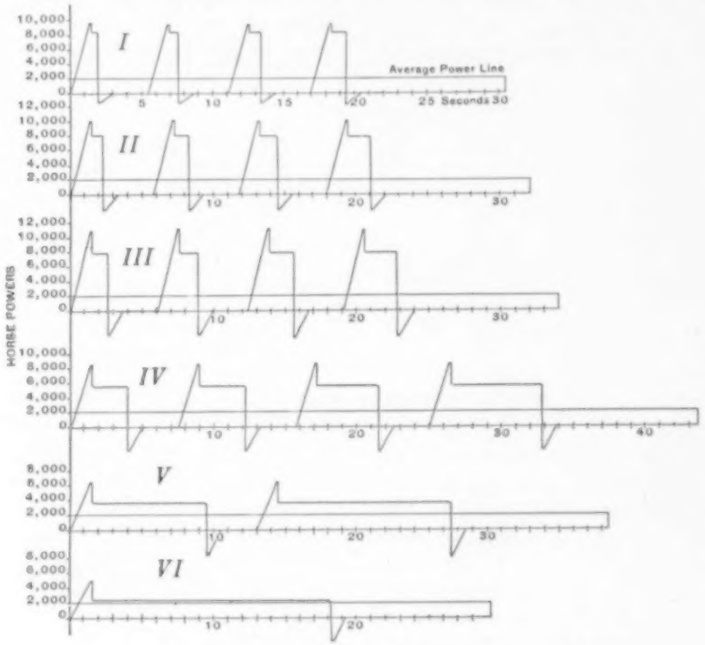


FIG. 9.—DIAGRAM SHOWING EQUALIZATION OF POWER WITH THE SIEMENS-ILGNER SYSTEM OF DRIVING MAIN REVERSING ROLLS.

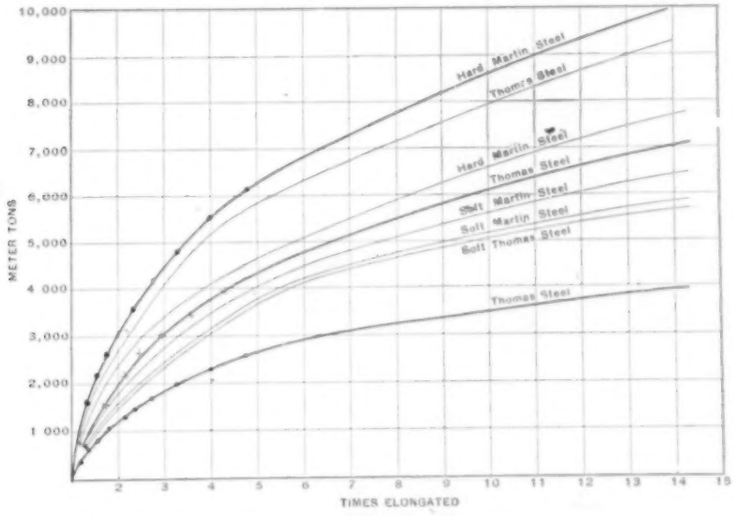


FIG. 8.—POWER CURVES SHOWING THE WORK NECESSARY AT THE ROLL SHAFT FOR ELONGATION TO DIFFERENT AMOUNTS OF 2.2-TON INGOTS OF VARIOUS KINDS OF STEEL.

It is not different to determine with considerable accuracy the amount of electric power required for rolling a given tonnage with the system above described. The following is an estimate for the yearly cost of rolling by this method 300,000 tons of billets, each billet weighing 2.2 tons. It is assumed that the billets would be rolled out to various lengths as indicated in columns 1, 2 and 3 of the table following. For each different final cross-section, it is assumed that 75 per cent of the production would be of soft Thomas or Martin steel, the remaining 25 per cent being of hard Martin steel. In the table below, the figures in column 6 give the tonnage of each kind. In column 7, are given the corresponding number of billets of each kind; in column 8 the energy required per billet, as taken from the curve, Fig. 8; and in the last column, the total work.

A capacity of 1,500 horsepower is set apart in the generating station for supplying the mill in question, this power corresponding to the average required, with adequate allowance for losses and occasional overloads. It is assumed that the engines in the generating station would be gas engines driven by blast furnace gas. The cost of a 1,500-horsepower gas engine generating plant would be about £17,500. Allowing 15 per cent of this per annum, or £2,625, for interest, depreciation and repairs, £250 for gas purification, £400 for attendance in the generating station, and £750 for oil, waste, etc., in the generating station the total cost per year would be about £4,000. Dividing this by the total production of 300,000 tons, the cost per ton is 3.2d.

It is difficult to obtain reliable figures for the corresponding cost of driving by steam. There is no doubt that, in an ordinary reversing mill engine, the steam is used in a very uneconomical manner. From published figures, it would appear that the cost per ton produced varies between 8½d and 1s 2½d. With older plants, it is probable that the cost considerably exceeds the latter figure. If for comparison, we take the smaller steam cost mentioned above, it would correspond in the case in question to a yearly cost of £10,625, and the difference between this and the cost of driving electrically amounts to £6,625. Taking the higher steam cost mentioned, viz. 1s 2½d per ton, the total annual cost of driving by steam would be £18,125, and the yearly saving £14,125.

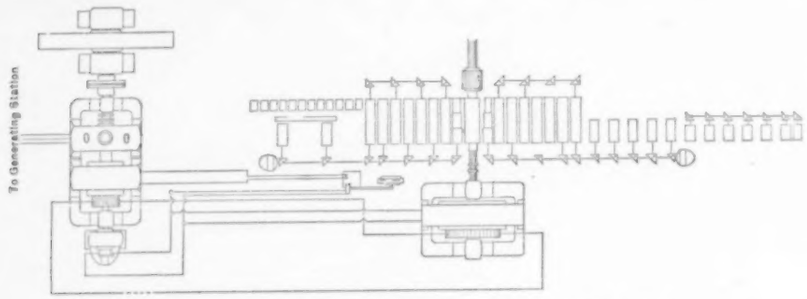


FIG. 10.—DIAGRAMMATIC PLAN OF SIEMENS-ILGNER SYSTEM AS APPLIED TO MAIN REVERSING ROLLS.

Detailed Calculation.

Production—1,000 tons in 24 hours, 300,000 tons per year (300 days).

Weight of billet, 2.2 tons.
Cross section, 16½ x 16½ inches.
Length, 67 inches.

One meter ton = 9.81 kilowatt-seconds. Therefore, the total energy equals 2,300,000 kilowatt-hours. With 300 working days of 24 hours, the average load will be

$$\frac{2{,}300{,}000}{300 \times 24} = 320 \text{ kilowatts.}$$

The combined average efficiency of the main roll motor and fly-wheel converter, including all losses, is about 40 per cent. Hence, the average power required for the rolls equals

$$320 \div 0.4 = 800 \text{ kilowatt.}$$

The maximum power per hour would be required for rolling out 38 blocks to the final cross-section of seven inches by seven inches. The corresponding energy required per hour is

$$27 \times 4{,}500 = 122{,}000$$
$$9 \times 6{,}500 = 58{,}500$$
$$180{,}500 = 1{,}770{,}000 \text{ kilo-watt-seconds.}$$

This corresponds to an average of 492 kilowatts during the hour. The combined efficiency under this load would be about 45 per cent, and the resultant power required would be

$$492 \div 0.45 = 1{,}100 \text{ kilowatts.}$$

The efficiency of generators in the generating station, including mains, would be about 85 per cent. For the maximum output, the corresponding output of the gas engines would therefore be

$$\frac{1{,}100}{0.85 \times 0.746} = 1{,}740 \text{ horsepower.}$$

For the average power, the output of the gas engines would be

$$\frac{800}{0.85 \times 0.746} = 1{,}260 \text{ horsepower.}$$

Percentage.	Final cross-section in inches.	Times elongated.	Soft Thomas steel and Martin steel. per cent.	Hard Martin steel. per cent.	Production in tons.	Production in billets.	Energy required for billet.	Total energy in meter tons.
2	12 x 12	2	75	—	4,500	2,050	2,000	4,100,000
—			—	25	1,500	683	3,000	2,100,000
40	7 x 7	5.4	75	—	90,000	41,000	4,500	185,000,000
—			—	25	30,000	13,600	6,500	88,500,000
40	5.1 x 5.1	10.5	75	—	90,000	41,000	6,200	255,000,000
—			—	25	30,000	13,600	8,700	118,000,000
18	4.3 x 4.3	14.5	75	—	40,500	18,400	7,000	129,000,000
—			—	25	13,500	6,150	9,600	59,300,000
					300,000			841,000,000

Working Costs.

It is assumed that the cost of the electrical equipment of the mill, including the fly-wheel motor generator, is about the same as that of a reversing mill engine and condenser.

Electrical Installation.

	£.	s.	d.
Interest, depreciation and repairs, 15 per cent of the first cost of a 1,500-horse-power gas engine unit, including gas engine, dynamo, excitation, switchboard, foundations, building, piping, gas, purification plant and electric conductors (£17,500)	2,625	0	0
Gas purification	250	0	0
Attendance at generating station	400	0	0
Oil, Waste, etc., in generating station	750	0	0
	4,025	0	0

For a production of 300,000 tons, cost per ton equals 3.2d.

Steam Installation.

Cost per ton, 8½d to 1s 2½d, or for a yearly production of 300,000 tons: £10,625 to £18,125.

AMERICAN TOOL BUILDERS NOT SO NEGLIGENT AS DESCRIBED.

It seems that the export methods of American manufacturers are not so hopelessly bad and inefficient as they have recently been painted by our consuls abroad. The export edition of the *New York Commercial* presents a few words of praise for the much-abused manufacturer, based upon the personal observations of one deeply interested in the subject.

"A machinery merchant who has been engaged in manufacturing in America, but who has had a wide experience in erecting American machinery abroad, having been for a number of years with a big English engineering firm, now tells us, much consular evidence to the contrary notwithstanding, that it is not the truth that all American manufacturers refuse absolutely to make any change in their products to suit the foreign purchaser. He says he has seen American-built tools abroad embodying many marked and important variations from the standard type.

"As to American packing methods, he says that he fails to see how American products suffer in any general comparison with those of any other country. In going through hardware stores abroad he found a general recognition of American acuteness in presenting an article in an attractive style. He even found one salesman who attributed the selling quality of American-made goods to the way they were packed and their merits set forth. As a consular criticism of the manufacturers, this merchant says that one must not be too receptive of the consular assertions."

series of contact plates suspended in a tank. By means of a small motor-driven circulating pump, water is made to rise or fall in the tank and submerge the contact plates to any required depth. The water when it comes into contact with the plates boils at the surface and gives off a small quantity of steam which escapes through an outlet pipe. By thus taking advantage of the great latent heat of steam, a starter of moderate size and cost can be produced capable of carrying very heavy currents. These starters have been used with the greatest success for main roll motors of large size. Drawings showing various typical arrangements of motor drives for non-reversing main rolls are given in Fig 2, 3. 4, and 5.

Equalization of Power.

Usually in steel works, motors have an intermittent load with periods in which the motor is either standing or running light and drawing only a small amount of current. For the smaller motors about the works, the variation in power required does not react unfavorably on the generating station, since the variations of a large number of motors tend to neutralize one another. In the case of large motors for driving main rolls, it is frequently desirable to screen the power station from the excessive peak loads of these large motors.

The most obvious method of doing this is to provide a fly-wheel on the rolls or motor shaft of sufficient weight for providing, without an excessive reduction in speed, the excess power required at each pass, the fly-wheel being restored to full speed between the passes. In adopting this plan care must be taken to design the motor and its control gear, so as to permit of a drop in speed without a corresponding rise in current demand, and thus enable the stored energy of the fly-wheel to be utilized. The practical method of accomplishing this in the case of continuous current motors is to provide a compound field winding and with induction motors to insert a fixed or a varying resistance in the rotor circuit, so as to increase the slip of the motor during the period of heavy load. The effects of inserting a resistance in the motor circuit and of employing a fly-wheel are shown by the diagrams of Fig. 6.

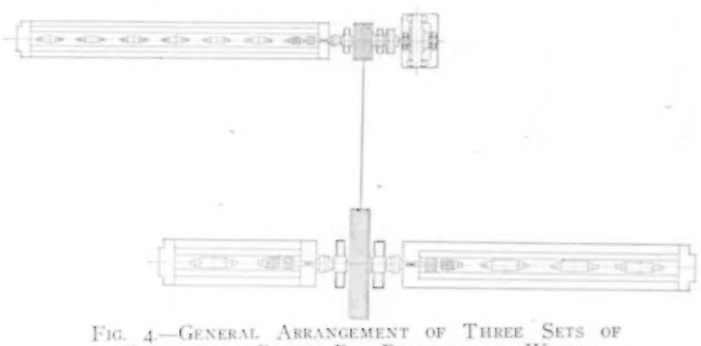


FIG. 4.—GENERAL ARRANGEMENT OF THREE SETS OF ELECTRICALLY-DRIVEN BAR ROLLS AT THE WORKS OF PIETRO MARIO CERETTI, VILLA DOSOLA, ITALY, THE MOTOR HAVING A MAXIMUM HORSEPOWER OF 400.

The first diagram shows the variation in current demand of the three-phase motor shown in Fig. 3, in which for purposes of experiment the fly-wheel was uncoupled and the slip resistance in circuit with the motor disconnected. The second diagram shows the same motor with the fly-wheel coupled and slip resistance connected in circuit.

The third diagram shows the same motor with the resistance still in circuit, but with another train of rolls similar to that shown in Fig. 3, connected on the oposite side of the large

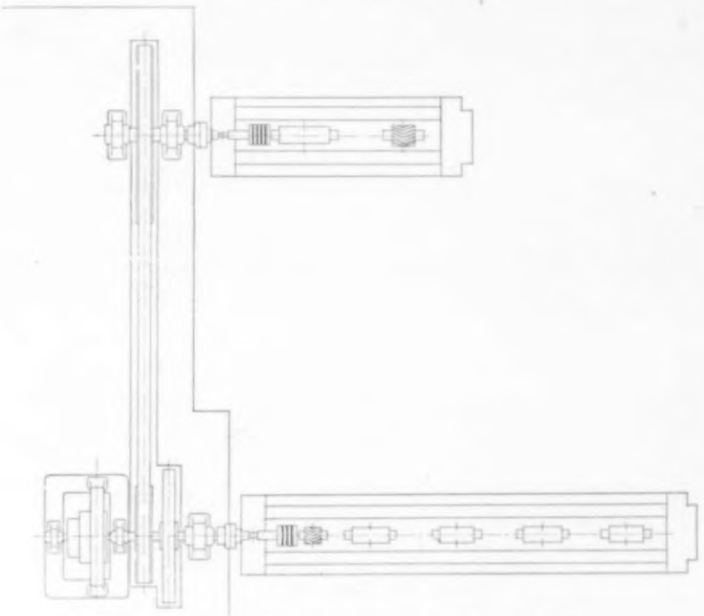


FIG. 5.—GENERAL ARRANGEMENT OF TWO SETS OF ELECTRICALLY-DRIVEN BAR ROLLS, THE MOTOR HAVING A MAXIMUM HORSEPOWER OF 600.

rope pulley, and an increased weight of flywheel. It is interesting to note the uniform appearance of this diagram, as compared with the very irregular current consumption shown by the first diagram.

In order to secure the best results under this plan, it is necessary to construct first, with as much accuracy as possible, a load diagram representing the heaviest duty of the mill, and showing the times required for the passes and intervals, and the power at each instant. An integration of the area of this load diagram will then give the average power to be supplied by the motor The motor should then be chosen to meet this power, but with ample overload capacity, and the fly-wheel proportioned, so that by a permissible reduction in speed, it will provide an amount of power at each pass equivalent to the correspondent load peak above the average.

When it is applicable, the plan described above is the simplest which can be adopted. There are cases, however, in which the peak loads are either so high, or of such long duration that, in order to completely neutralize them, by means of a fly-wheel direct-coupled to the motor or rolls, the weight of the fly-wheel required would be impracticable.

In such cases the excess demand on the generating station may be supplied by a storage battery; but the first cost of a storage battery is high, and also its cost of upkeep, and this has led engineers to search for some simpler means of accomplishing the same purpose.

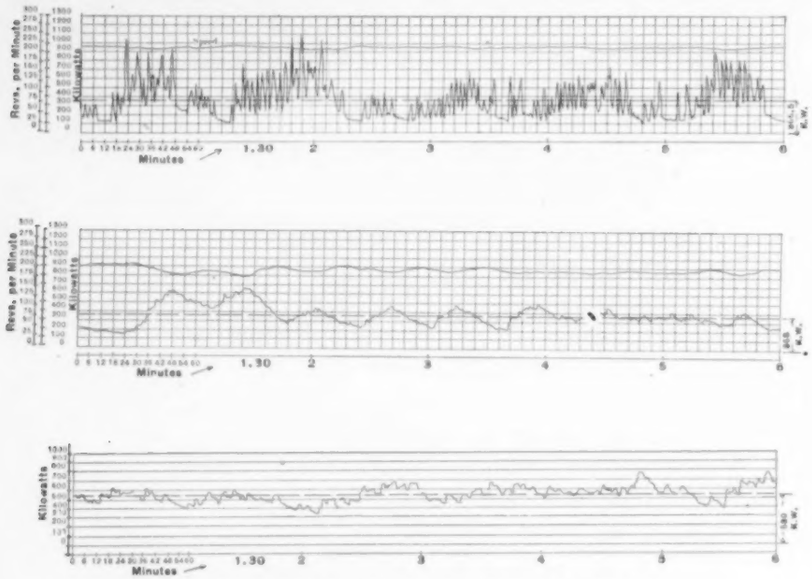


FIG. 6.—DIAGRAM ILLUSTRATING THE EFFECT OF EQUALIZATION OF LOAD BY MEANS OF A FLY-WHEEL AND SLIP RESISTANCE.

Such is illustrated in Fig. 7. This indicates two main roll motors, whose power is equalized by a fly-wheel motor-generator set. The three-phase motor of the motor-generator set draws from the generating station an approximately uniform current, which is equal to the average of the currents required by the main roll motors. The variations in power are neutralized by the fly-wheel in a manner similar to that already described in the case of the fly-wheel direct-coupled to the rolls; but by coupling it to the motor generator, it is possible to run the fly-wheel at a much higher speed, and, therefore, with the same weight of wheel, to store a far greater amount of energy.

A better but slightly more costly arrangement is to have a separate generator on the motor-generator set for each main roll motor. In the case shown, there would then be two generators instead of one. When this is done, a simple means is also afforded for varying the speed of either main roll motor by changing the field strength of its corresponding generator.

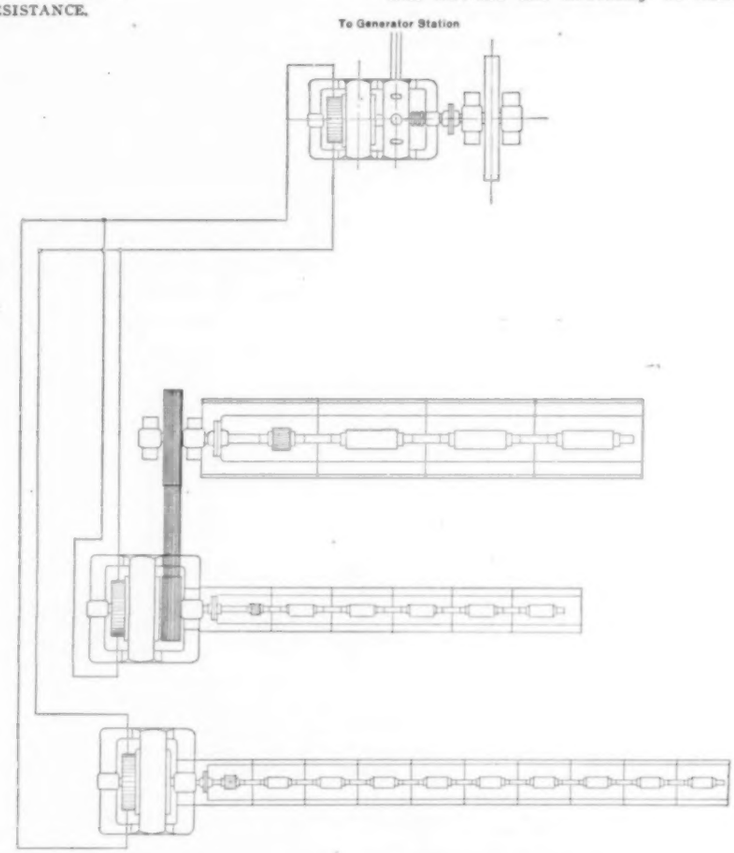


FIG. 7.—DIAGRAM ILLUSTRATING METHOD OF EQUALIZATION OF POWER BY MEANS OF A FLY-WHEEL CONVERTER.

By means of continuous indicator diagrams taken from reversing mill engines, the load requirements may be analyzed.

Fig. 8 shows a set of curves plotted, as the result of a series of tests, showing the total work required for elongating billets weighing 2.2 tons to different amounts. The curves are interesting, as showing the relative powers required at the different stages of elongation. The absolute powers required, however, vary greatly with the temperature of the billet.

In order to study the problem of electric driving for main reversing rolls, it is convenient to plot the powers required in the various stages of rolling, as shown in Fig. 9. The powers required for rolling out a four-ton billet are there shown. The diagram is a simplified and more convenient representation of the powers shown by a continuous indicator diagram. During the initial stages, when the billet is short, the loads are heavier and their duration shorter. The powers then gradually decrease, and the length of time during which the power is applied increases as the billet elongates, until finally we have the long, low diagram of the last passes. The integration of these areas is shown by the average power line.

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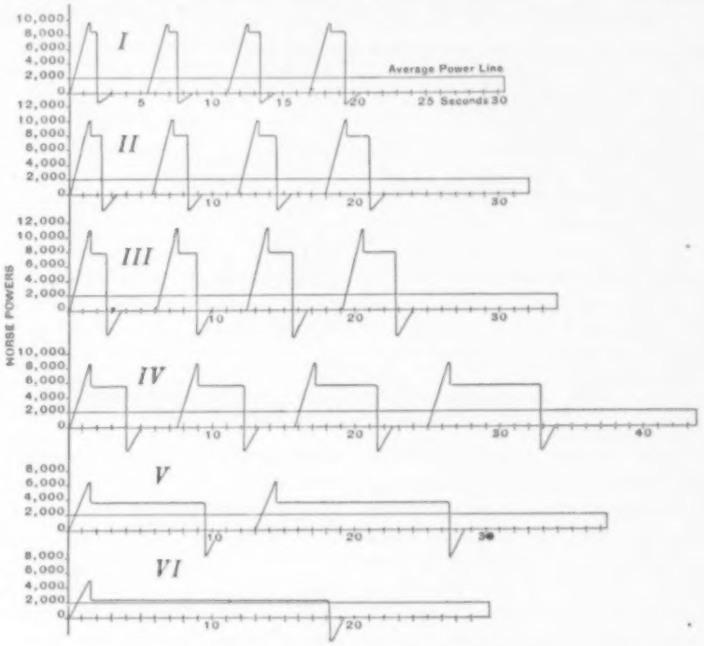

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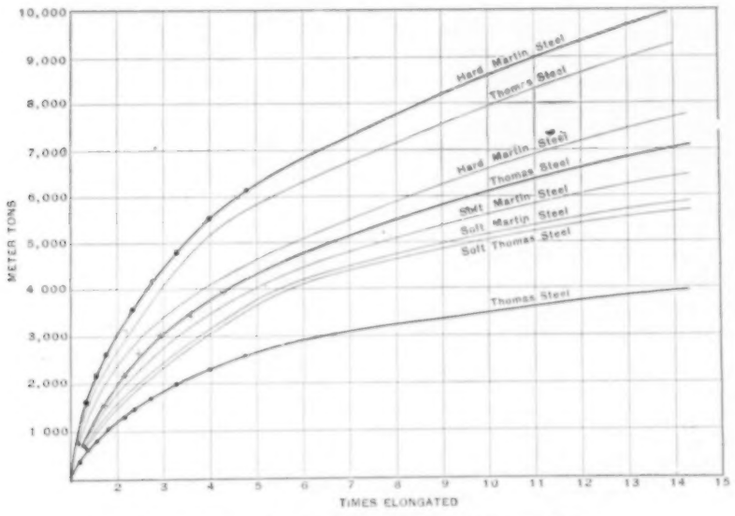

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It is not different to determine with considerable accuracy the amount of electric power required for rolling a given tonnage with the system above described. The following is an estimate for the yearly cost of rolling by this method 300,000 tons of billets, each billet weighing 2.2 tons. It is assumed that the billets would be rolled out to various lengths as indicated in columns 1, 2 and 3 of the table following. For each different final cross-section, it is assumed that 75 per cent of the production would be of soft Thomas or Martin steel, the remaining 25 per cent being of hard Martin steel. In the table below, the figures in column 6 give the tonnage of each kind. In column 7, are given the corresponding number of billets of each kind; in column 8 the energy required per billet, as taken from the curve, Fig. 8; and in the last column, the total work.

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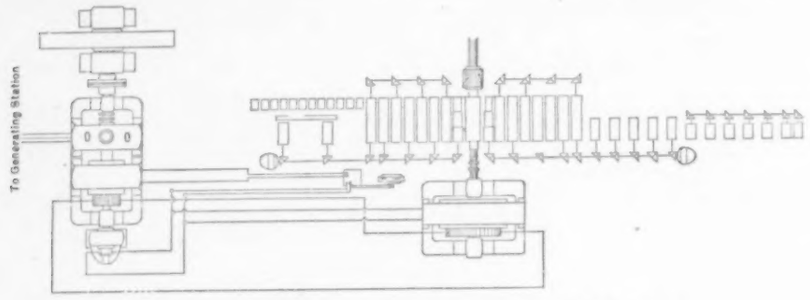

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Weight of billet, 2.2 tons.

Cross section, 16½ x 16½ inches.

Length, 67 inches.

One meter ton = 9.81 kilowatt-seconds. Therefore, the total energy equals 2,300,000 kilowatt-hours. With 300 working days of 24 hours, the average load will be

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This corresponds to an average of 492 kilowatts during the hour. The combined efficiency under this load would be about 45 per cent, and the resultant power required would be

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Working Costs.

It is assumed that the cost of the electrical equipment of the mill, including the fly-wheel motor generator, is about the same as that of a reversing mill engine and condenser.

Electrical Installation.

	£.	s.	d.
Interest, depreciation and repairs, 15 per cent of the first cost of a 1,500-horse-power gas engine unit, including gas engine, dynamo, excitation, switchboard, foundations, building, piping, gas, purification plant and electric conductors (£17,500)	2,625	0	0
Gas purification	250	0	0
Attendance at generating station	400	0	0
Oil, Waste, etc., in generating station	750	0	0
	4,025	0	0

For a production of 300,000 tons, cost per ton equals 3.2d.

Steam Installation.

Cost per ton, 8½d to 1s 2½d, or for a yearly production of 300,000 tons: £10,625 to £18,125.

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It seems that the export methods of American manufacturers are not so hopelessly bad and inefficient as they have recently been painted by our consuls abroad. The export edition of the *New York Commercial* presents a few words of praise for the much-abused manufacturer, based upon the personal observations of one deeply interested in the subject.

"A machinery merchant who has been engaged in manufacturing in America, but who has had a wide experience in erecting American machinery abroad, having been for a number of years with a big English engineering firm, now tells us, much consular evidence to the contrary notwithstanding, that it is not the truth that all American manufacturers refuse absolutely to make any change in their products to suit the foreign purchaser. He says he has seen American-built tools abroad embodying many marked and important variations from the standard type.

"As to American packing methods, he says that he fails to see how American products suffer in any general comparison with those of any other country. In going through hardware stores abroad he found a general recognition of American acuteness in presenting an article in an attractive style. He even found one salesman who attributed the selling quality of American-made goods to the way they were packed and their merits set forth. As a consular criticism of the manufacturers, this merchant says that one must not be too receptive of the consular assertions."

NEW PLANT OF THE NATIONAL TUBE COMPANY,

OFFICIAL DETAILS OF THE PLANS AT MC KEESPORT.

Old Site Cleared Away and Considerable Progress in Construction Already Made.

The National Tube Co., when appropriations were made for increasing its facilities at the McKeesport, Pa., plant were made, decided to make this plant the most modern of its kind in the world and this idea is now being carried out on a large scale. The old site of the National Rolling Mill Co., McKeesport, as shown in the accompanying illustration, has been cleared away and a mill building covering practically 20 acres will be erected upon it. Some idea of the scale upon which the new mill will be built has been given from time to time, but the following is the first complete detailed account of the project presented to readers of THE IRON TRADE REVIEW. When completed the developments will represent an expenditure by the National Tube Co., of approximately $10,000,000.

New Plants Installed.

There has already been installed and in operation since the first of the year an additional blast furnace stack of the most modern construction and ground is cleared for a fourth; a new slabbing mill, on which all four sizes of the ingot may be worked at once, whose production is handled on the largest geared shear in the world; in the place of scattered pumping stations, there is already in operation a thirty-million gallon pumping station of the most modern type, consisting of three triple-expansion condensing pumps, handling water through an elaborate settling basin system and distributing from a high tower through 36-inch mains for a distance of over a mile to all parts of the old and new plant. A metal mixer has been installed; an additional converter and equipment so as to practically double the production of the old steel works installation; ore bridge and new bins placed in operation and arrangements made for a car dumper, by which ore, coke and limestone at the furnaces will be handled in the most modern fashion. New steeple type blowing engines are in operation; new approaches, trestles and track connections, so that everything at this end of the plant may be handled in the most economical manner.

Between the furnace plant and the new rolling mill stands, very nearly completed, the turn-table, round-house and locomotive and car repair shop where locomotives can be housed when not in service, and locomotives and cars can always be kept in repair. During the last year the ground formerly occupied by the old Bowery district has been completely covered by modern steel and brick buildings, crane runways, overhead track system, shops, etc. In the new plate mill, which has been in operation since the latter part of January, the slabs are taken direct from the cars by electric charging machines, heated, delivered to the mill, rolled, passed through the straightening machine, across the cooling beds, and delivered to the shear entirely by use of machinery, and after being trimmed, are loaded on cars with electric cranes for shipment to the tube and pipe mills. The other rolling mills in course of construction, and which will be put in operation one at a time as completed between now and the first of next year, are all of the most modern type, doing away with the dangerous and laborious hand work of the old mills, and making it possible to have the men directing the work well away from the heat and danger. Long crane runways have already been installed, which are now being used for shipping and stocking pipe, but which will eventually have stored under them the stock piles of slab and finished skelp.

The coal hoist and crushing plant, where coal is lifted from the river or cars, is deserving of special notice. This plant is already in operation, and designed to handle two thousand tons of coal in ten hours. By this arrangement coal is lifted from the river or cars, passes through crushers and over screens, where it is divided into nut and slack, and from this point, by an overhead system and by means of small coal cars, drawn by electric locomotives, is distributed to all parts of the plant and deposited through drop bottoms into bins, from which, by spouts, it is led to the boilers, producers and furnaces, etc. And in this same connection, below ground are corresponding ash tunnels where the ashes are collected in small cars drawn again by electric locomotives to central points, where the ashes are raised into bins, from which they are deposited into road cars for shipment.

Handling Facilities.

The shops of this department are grouped along a crane runway which is connected with a cross crane runway, so that rolls machinery, spares, etc., may be carried from any part of the entire rolling mill plant and deposited in the shops without the use of a locomotive, car or hand truck, and along the same crane runway, hot steel may be transferred from one group of heating furnaces to any one of the sets of mills.

In the center of the rolling mill plant, and in close proximity to the new boilers, is the new water purifying system, by which the highly acid and scale-forming river water is so treated that it becomes harmless for the corrosion or scaling of pipes and boilers. This water, after being treated, is delivered from a stand pipe to all parts of the plant, both furnaces, steel works, rolling mill and tube and pipe mills, where it is made use of in boilers, hydraulic systems, etc.

The engines of the new rolling mill are all of the most modern type, compound condensing engines of the heaviest rolling mill construction, and in many cases drive several stands of rolls by use of modern rope drive construction.

Between the new rolling mill and the proposed new tube and pipe mills is located the new electric power house, containing four 600-kilowatt direct-current generators, each direct-connected to a 1,000-horsepower cross-compound steam engine. These units now supply current for the entire plant, and for the W. D. Wood plant of the American Sheet & Tinplate Co. Two additional units are being added, consisting each of a 1,000-kilowatt generator, direct-connected to a gas engine of 1,700 horsepower, which will be supplied with furnace gas brought from the blast furnaces and led through suitable cleaning and washing apparatus. Adjoining the electric power house is the electric repair shop, where nearly all of the electric cranes now in use on the plant have been designed and constructed.

Largest Mill Building.

The ground where the old plate mill stood is being cleared and in the course of a very short time the tube and pipe mill department will begin the erection of what, it is said, will be the largest mill building in the world, covering more than twenty acres of floor space, nearly every square foot of which will be served by an overhead electric traveling crane. This building, or series of

CLEARING OFF THE SITE OF THE OLD NATIONAL ROLLING MILL CO., MCKEESPORT, PA., FOR THE NEW $10,000,000 PLANT OF THE NATIONAL TUBE CO.

buildings forming one, will be constructed of steel and brick and will extend, without a break in the roof covering, from Armstrong street to Locust street, and will be 567 feet wide. One portion, nearly one-third of a mile long, will be covered by roof trusses which span 158 feet, and at their centers carry crane runways for 15-ton traveling cranes.

The pipe welding furnaces and machinery for the production of sizes from one-eighth inch to 36 inches diameter, will be located in this large portion of the building and the balance of the building will be used for cooling tables, finishing and testing equipment, and for stocking. The skelp will be handled direct from cars and this operation, together with the successive ones of charging, scarfing, bending, welding, sizing, straightening, cooling, stocking and shipping, will be accomplished by the use of the most modern machinery and labor-saving devices, all operated by electric motors deriving their power from the central electric power house elsewhere described. Large areas have been reserved for stocking pipe of all sizes under cover.

Protection for Employes.

In the pipe mills, as elsewhere in the plant, arrangements are being made to minimize the exposure of employes to heat and danger by placing the controlling levers and devices as remote as possible from hot and dangerous machinery. Great attention has been given to the question of light and ventilation. The best possible arrangement for lighting the large building has been aimed at and entirely satisfactory results are expected. Fresh air will be taken from outside the building and blown directly on the men exposed to great heat, and large heating and ventilating systems will be installed for those parts of the building remote from the hot furnaces and pipe, so that it is expected that at all times as pure air and as comfortable a temperature will be maintained as is possible in so large a structure.

Between the pipe mills and the west end of the company's property or, more definitely, between Locust street and Walnut street will be located the main shops, consisting of iron and brass foundries, boiler shop, blacksmith shop, couplings shops, machine shop, pattern shop and pattern storage. The pattern shop and pattern storage building, which occupy a portion of the machine shop building, are practically completed and are in use. The pattern storage department oc-

cupies three upper floors of a four-story portion of the building, which is of steel with brick curtain walls and reinforced concrete floors. The pattern storage floors have no windows nor any openings whatever inside of the walls, the only access to these floors being by means of an outside elevator carried on a skeleton steel frame fastened to the steel frame of the building. Each floor is provided with a fireproof door and the electric light switch is placed in a recess in a brick wall outside the door. A special pipe line for fire purposes only runs along the elevator structure and at each floor is placed a reel of hose ready for instant use in case of fire. These precautions seem adequate to protect the valuable patterns of the company from damage by fire. The shops will be connected with each other and with the different mills and the electric repair shops by means of an overhead trolley or telpher, which will be able to travel without interference and convey machinery or materials not aggregating more than 4,000 pounds, from any department to any other department, necessitating but one operator.

Particular attention is directed in an effort to secure thorough sanitary equipment throughout the plant for all employes.

Railroad Connections.

According to the new plans the three railroads will each be given additional connections by which both incoming and outgoing freight may be easily handled to and from the plant.

Below Riverton the Pennsylvania railroad will construct its new freight yards on the ground now being occupied by the Boston mill, and inside the fence, which will run around the entire property, will be large yards for receiving and delivering freight from the different roads. And again, to better handle the work in the McKeesport mills, it has been deemed advisable to separate the specialties of job shop, trolley pole shop, etc., from the regular product so that large additions have already been made to the galvanizing plant at Versailles, and some departments are in operation, where all of this special work will be handled in the most modern way under electric traveling cranes and shipped and stored in buildings and yards in the same manner. In order to make room for these extensions the office building at Versailles has been moved to a new location, made nearly double its former size and completely remodeled and renovated.

MINES OF THE EASTERN MESABI.

Office of THE IRON TRADE REVIEW. } Duluth November 3}

Around the shores of Embarass lake explorations have been carried on at a number of different times extending over a period of considerable length. The Oliver Iron Mining Co. drilled there and came to the conclusion that it was too wet. Geo. A. St. Clair holds a large acreage there and has done more or less drilling. Through him, Pickands, Mather & Co. obtained the leases on the Bangor and Syracuse forties on the north shore of the lake. The latest development in that section is the striking of ore in the southwest quarter of section 5 58-15 on the land of D. T. Adams.

The work on the Bangor and Syracuse has been a continuous struggle against quicksand and water and up to the present time the quicksand and water have come out ahead, adding meanwhile very heavily to the ultimate cost per ton of the ore. The Syracuse shaft was the first to be attempted and was put down to a depth of 75 feet, but the timbering would not hold and the work was finally given up. In the meantime the Bangor shaft was started and sunk to a depth of 30 feet, when the quicksand was struck there also and as a result the work was abandoned for the time without attempting to go further. At present the Bangor shaft is practically all filled in and the Syracuse shaft is partly filled and more or less twisted out of shape. At this juncture a contract for sinking both shafts was given to the Foundation Co., of New York, which will use the same methods as are customary in excavating for submarine abutments, pneumatic pressure being used to hold back the water and sand while the walls are being built up. F. W. Adgate is superintending the work and the shaft of the Syracuse will be first repaired.

Bangor's New Shaft.

An entirely new shaft will be started at the Bangor to be located about two hundred yards to the eastward of the old one and the same mode of operations will be adopted as at the Syracuse except that a steel lining will be put down. During the last few months the power plant at the old location has been torn down and all the equipment is about to be moved over to where the new shaft is to be put down. The ore bodies in this section and on both sides of the lake are of high grade and of fair size. It is not known whether sinking on the Adams property will be as troublesome a proposition, but from the looks of the test pits of which several have been sunk, sand has been struck uniformly at a depth of ten or fifteen feet.

Two and a half miles east of the lake Pickands, Mather & Co. have another mine which is understood to be one of the most promising properties this company has on the Mesabi. It is located in the northwest of the southwest of section 4, 58-15 and the shaft is down to a depth of 200 feet. The ore is being worked out from a main level and two subs and has an average depth of about 50 feet. It lies between hanging and foot walls of taconite, in some places pinching out entirely and in other places having seams of taconite running through it. The property was just open opened for shipment this spring and will have produced by the end of the season about 90,000 tons. Alex. McDougall is the superintendent of Pickands, Mather & Co.'s eastern Mesabi properties including the above three mines.

The New Miller Mine.

The Miller mine on the adjoining forty to the east and operated by the Pitt Mining Co., that is the La Belle Iron Works, is a proposition very similar to the Mohawk. The Miller shipped for the first time last year, getting out 118,520 tons which quantity will be somewhat increased this year. The shaft is 220 feet deep and the mine is being worked out with no unusual details. Like all the mines of the eastern end of the range, where there is a great deal of marshy ground, the Miller like the Mohawk handles quite a quantity of water. The boiler plant is unique in that marine type boilers are being used. They were built by S. Freeman & Sons Mfg. Co., of Racine, Wis., are rated at 250 horsepower and are giving very good results. Wellman-Seaver-Morgan hoists are installed. C. E. Moore is the general superintendent for the Pitt Mining Co. whose mines include the Wacoutah at Mt. Iron, and the La Belle and Pitt at McKinley, beside the Miller. Capt. Carkeek is in charge of the underground work.

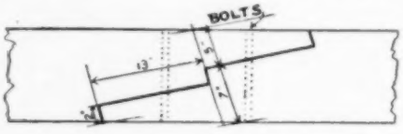
In the next section east are the Meadow and Fowler properties of the Interstate Iron Co. of which William White, better known as "Cap." White is the superintendent. Both are lands newly opened this year, though neither of them will be in a condition to ship this season. In February last

the shaft on the Meadows forty was started. It is a three compartment shaft and although it has been sunk to a depth of 120 feet, its location and condition are not altogether satisfactory and another one will probably be put down on the northeast corner of the property. Beside having to contend with an inconvenient volume of water in the shaft, taconite was encountered only a part of the time in the shaft and in undesirable quantities in the ore. At the present time a drift is being driven into the ore between taconite above and below. The Fowler forties adjoin on the east side and are now being drilled by Geo. A. St. Clair from whose father, Geo. H. St. Clair, the leases on the properties were obtained. A shaft will probably be sunk there next year.

The three forties between the Meadows and the townsite of Aurora have been leased by Corrigan-McKinney & Co. and a shaft will be located on the southwest forty of the southwest of section 3, town 58, range 15, adjoining the townsite.

Advantageous Location.

In the matter of natural advantages of location the Stephens mine under lease to and partly owned by the Oliver Iron Mining Co. is perhaps more favored than any other open pit on the Mesabi. It is a large body of ore, the lease covering fourteen forties in sections 23, 25 and 26, 59-15 and is located on the south slope of the ridge about two miles in from Colby. The surface equipment, boiler house, warehouses, shops, office buildings and dwellings have a size and appearance that evidences the large operations in prospect at this mine. The lay of the ore in its location on the side of the hill is such that the pit is being opened and can be for some time with a down grade out of the pit. This will be true for all of the stripping and for some time after work is again started in ore as evidenced by the fact that the 370,000 tons taken out last year came from a narrow cut running straight into the center of the ore body and yet no grade out of the pit became necessary. Shipments were suspended all of this year, probably for several reasons. The operating company owns half of the mine in fee. The ore was not needed because of its quality and from the manner in which the stripping is being carried on it would seem that the intention is to prepare for the taking out of ore so that all of the natural facilities for cheap mining may be taken advantage of. The stripping is unusually light averaging not more than fifteen feet for a great part of the area now opened though at the north end it is heavier and is of a material not more than ordinarily difficult to handle. At the time the mine was visited, one shovel was working on the east bank at the south end, the mine lying north and south with the approaches on the south or low end, the stripping approach on the west side and the ore approach out of the east side of the south end. Another shovel was taking a cut along the west bank at the north end and a third shovel was clearing off an island of overburden at the north end. The pit is being opened over a considerable area and before the shovels start in ore again, all possibility of the mining crowding on the stripping will have been avoided. Standard stripping equipment is being used, each locomotive handling ten seven-yard cars. The dumps were three in number of which but two were being used and the run out is shorter than usual. At the average rate of working, the three shovels were digging about 3,500 yards every ten hours.



SPLICE IN TIMBER.

In addition to the advantages possessed in the manipulation of ore and stripping, the natural grade of the pit causes all the water entering it to run right through to the lower end and out without costing a cent in disposing of it. C. W. Williams is the resident superintendent of the mine and it may be said that the splendid appearance of the entire location is in keeping with the natural facilities for extensive operations.

The Adriatic Deposit.

The only other active mine between Aurora and Mesaba is the Adriatic, a deposit that Pickands, Mather & Co. and Joseph Sellwood have opened jointly this year with William Mudge in charge. As an indication of the difficulties that attended the sinking of the shaft owing to water and quicksand, only 70 feet, at which depth ore was reached, was attained from May 1 when the sinking was started until July 27. Now the shaft is down solidly for a distance of 110 feet, but the water continues to pour in at the rate of 1,300 gallons a minute. The shaft which has three compartments is equipped with two No. 9 and two No. 10 Camerons and they are kept busy all of the time. An incident showing the situation was related. Through an accident to the bottom No. 10 it was shut down and the water rising over the second No. 10 which was not receiving as much steam as it should, put it out of commission. Then with the two No. 9 Camerons working the water rose 14 feet in 20 minutes, until the other pumps could be started again.

Drifting has been carried in for a distance of about 75 feet and the water is also coming in through the back of the drifts. There seems to be no prospect of relief from the wetness until the ground has been pretty well opened. The ore which is not quite a Bessemer grade was being hoisted in a barrel hoist such as is commonly used before the power plant and large hoists have been installed for the big skip and about a car a day of ore was being brought up. But little taconite has been encountered.

The shaft house has been erected and the hoist sheaves are in place. The shaft house is worthy of special mention in that while it is ordinarily large in size, being 30 x 26 feet on the ground, no timbers longer than 16 feet have been used in its construction. The desired length has been obtained by splicing two short lengths together in a manner similar to timber splices in marine work, as shown in the accompanying sketch.

The Most Easterly Body.

The Mayas mine, the only body of ore opened east of the Duluth & Iron Range road, is located almost at the extreme east end of the Mesabi. The Old Mallman mine now inactive is perhaps the most easterly ore body of which there is any knowledge. The Mayas, beside being noteworthy in connection with its isolation, is unique in some of the features of its operations. It is operated by the Mayas Mining Co. representing the interests of A. M. Miller Jr., of Duluth, A. B. Coates, who is in charge of the working of the mine, and others. The Giants ridge is quite pronounced at this end and rises to a considerable elevation. The Mayas ore body lies in the crest of the ridge, dipping slightly with the north slope and rising within three and four feet of the surface near the top of the hill. The ore has been mined to a fair depth and to reach the pit a tunnel has been built through the side of the hill running in on the bottom ore level.

Stock Market Quiet With Changes Small.

The most notable feature of the stock markets of the past week was the action of the Pennsylvania railroad directors in increasing its rate of dividend from a six per cent to a seven per cent basis. This advance, taken in connection with the report that some 150,000 employes of that system are to have their wages increased, furnishes striking proof of the remarkable strength of our transportation companies and makes it clear that in spite of recent fare limitations and other so-called "hostile" legislation railroads are able to earn increased profits by reason of the enormous amount of business pressing upon them. The Pennsylvania advance furnished the only stimulating factor of the week and the market was generally irregular and quiet with narrow fluctuations. In spite of the fact that its quarterly report showed net earnings considerably less than popular estimates, the Steel Corporation stocks held their own and only the "fives" of the corporation declined. The political situation and the money situation continued prominent. Call rates were at 9 per cent for a considerable part of the week and the bank of England advance remained unchanged, though with the approaching end of the crop moving period an easier tone is expected to prevail. The foreign situation, particularly in Russia, has improved considerably, and there is nothing in the local outlook to indicate any decrease in the volume of business.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. Oct. 27.	Closing Quotation Nov. 3.	Changes	Date of 1906 Ann. Meet.	Par Value	Capital Outstanding	Dividend Basis	Dividend Being Paid	Dividend Date Last Div. Pay.
Allis-Chalmers Co	17⅛	16⅝	− ⅛	Sept.	100	19,820,000			
Allis-Chalmers preferred	44¾	45½	+ ⅞		100	16,150,000	7 cum		Feb., 1904
American Can	6	6¼	+ ¼	Apr. 24	100	41,233,300			
American Can preferred	55	54	−1		100	41,233,300	7 cum	5 Q.	Oct., 1906
American Car and Foundry	44	44⅝	+ ⅛	June 28	100	30,000,000			May, 1905
AmericanCar and Foundry preferred	100⅜	101½	+1⅛		100	30,000,000	7 n. c.	7 Q.	Oct., 1906
American Locomotive	74⅛	74⅛	.....	Oct. 16	100	25,000,000		1¾	Nov., 1906
American Locomotive preferred	111	111	.....		100	24,100,000	7 cum	7 Q.	Oct., 1906
American Shipbuilding	69⅞	76	+5⅛	Oct. 2	100	7,600,000	4 n. c.	1 Q.	Aug. 1906
American Shipbuilding preferred	109½	109	− ½		100	7,900,000	7 n. c.	1¾ Q.	Aug. 1906
American Steel Foundries	9⅜	10½	+ ⅛	Oct. 3	100	17,700,000			
American Steel Foundries preferred	43⅜	44¼	+ ⅛		100	17,700,000	6 cum	.....	Aug., 1905
Barney & Smith	70	72	+2	June 5	100	1,000,000	4	4	Sept., 1906
Barney & Smith preferred	140	140	.....		100	2,500,000	8 cum	8 Q.	Sept., 1906
Bethlehem Steel	18	18	.....	April 3	100	15,000,000			
Bethlehem Steel preferred	67¼	67¼	.....		100	15,000,000	7 n. c.	7 Q.	Aug., 1906
Bullock Electric preferred	112	112	.....	Oct. 2	100	1,000,000	6	6 Q.	July, 1906
Cambria Steel	37⅛	37¼	− ⅛	March 20	50	45,000,000	6	3 Q.	Aug., 1906
Cambria Iron	49	48	−1		50	8,468,000	4	4 S. A.	Oct., 1906
Colorado Fuel & Iron	51⅛	52¼	+ ¾	Oct. 15	100	30,132,000	7	.....	Apr., 1902
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	16	16	.....	May 31	100	6,098,000	5	.....	Nov., 1902
Crucible Steel	11¾	13⅛	+1⅜	Oct. 17	100	25,000,000		.....	
Crucible Steel preferred	77⅛	79¾	+2⅝		100	25,000,000	7 cum	.....	Sept., 1906
Empire Steel	8	8	.....	Feb. 28	100	2,281,400		.....	
Empire Steel preferred	48	48	.....		100	2,500,000	6 cum	3 S. A.	July, 1906
Fay & Egan	95	95	.....	Feb. 20	100	1,000,000	6	6 Q.	Aug., 1906
Fay & Egan preferred	128½	128½	.....		100	1,000,000	7 cum	7 Q.	Aug., 1906
General Electric	174	175	+1	May 8	100	48,256,050	8	8 Q.	Oct., 1906
International Pump	44¾	45	+ ¼	June 5	100	12,262,500		2	July, 1905
International Pump preferred	81½	81	− ½		100	8,850,000	6 cum	6 Q.	Nov., 1906
Lackawanna Steel	72	72	.....	March 14	100	34,971,400		.....	
Lake Superior Corporation	15½	16½	+1	Oct. 3	100	40,000,000		.....	
Niles-Bement-Pond	130	130	.....	Feb. 7	100	5,000,000	6	6 Q.	Sept, 1906
Niles-Bement-Pond preferred	105	105	.....		100	2,000,000	6 cum	6 Q.	Aug., 1906
Otis Elevator Co	50	50	.....	March 19	100	6,350,300		2 A.	Apr., 1906
Otis Elevator Co. preferred	96	97	.....		100	5,589,500	6 n. c.	6 Q.	Oct., 1906
Pittsburg Coal Co	16¾	16⅜	− ⅜	Feb. 12	100	30,135,000		.....	
Pittsburg Coal preferred	59	59½	+ ½		100	30,716,200	7	.....	Apr., 1905
Pressed Steel Car	54	54⅜	+ ¾	Feb. 21	100	12,500,000		3	Aug., 1904
Pressed Steel Car preferred	98¾	99	+ ¼		100	12,500,000	7 n. c.	7 Q.	Nov., 1906
Pullman Palace Car	261⅛	259½	−2	Oct. 18	100	74,000,000		8 Q.	Oct., 1906
Railway Steel Spring	52	51¼	− ¾	March 1	100	13,500,000		4 S. A.	Oct., 1906
Railway Steel Spring preferred	100	100	.....		100	13,500,000	7 cum	7 Q.	Sept., 1906
Republic Iron & Steel	35¼	35½	.....	Oct. 17	100	27,352,000		.....	
Republic Iron & Steel preferred	96½	97⅝	+1¼		100	20,852,000	7 cum	7 Q.	Oct., 1906
Sloss-Sheffield	72	73	+1	March 14	100	7,500,000	5	5	Oct., 1906
Sloss-Sheffield preferred	106	106	.....		100	6,700,000	7 n. c.	7 Q.	Oct , 1906
Tennessee Coal & Iron	155	160	+5	May 15	100	22,552,800		4 Q.	Nov., 1906
U. S. Cast Iron Pipe & Foundry	46¾	47½	+ ¾	June 27	100	12,500,000		2	Dec., 1906
U. S. Cast Iron Pipe & Foundry preferred	90¾	91	+ ⅛		100	12,500,000	7 n. c.	7	Dec., 1906
U. S. Steel	47½	47¾	+ ⅛	April 16	100	508,302,500	2 n. c.	½ Q.	Oct., 1906
U. S. Steel preferred	106¾	106¾	+ ⅛		100	360,281,100	7 cum	7 Q.	Nov., 1906
U. S. Steel 5's	100⅞	98⅞	−2⅛		100	463,798,000	5	5 A.	
Virginia Iron, Coal & Coke	52½	55	+2½	Sept. 18	100	8,641,600		.....	
Westinghouse Electric	154	154½	+ ½	June 27	50	20,998,350	10	10 Q.	Oct., 1906
Westinghouse Air Brake	160	158½	−1½	Oct. 2	50	10,990,450	30	30 Q.	Oct., 1906

Financial Notes:—

According to Bradstreet's, October saw 803 failures with liabilities of $11,824,798, as compared with 810 failures and $12,833,779 liabilities in October a year ago. With one exception, this is the smallest number of failures for October in 14 years. One failure of a firm of private bankers accounted for over one-third of entire liabilities.

President Smith, of the Crucible Steel Co., states that the quarterly preferred dividend to be declared in December will be at the full rate of 1¾ per cent. There is due in back dividends about 16½ per cent on the preferred stock.

The Alabama Consolidated Coal & Iron Co. has declared the regular quarterly dividend of 1¾ per cent on preferred stock, payable Dec. 1.

The United Machinery Corporation is offering at par $1,628,400 worth of common stock, the proceeds to be used for corporate purposes.

The Chicago Pneumatic Tool Co. has applied to list its securities on the Pittsburg exchange.

NEWS FROM MANY INDUSTRIES.

New Buyers:—

The United States Steam Engine Co., Milwaukee, Wis., has been incorporated with a capital of $40,000 by Louis Schieble, Jesse E. Matteson and Clark S. Matteson.

The John Pirki Foundry Co., has been incorporated with a capital stock of $100,000, to manufacture iron. The incorporators are: John Pirki, 240 North Tenth street, Brooklyn; G. L. Schnepp, and Henry H. Hull, all of Brooklyn.

The Hess Spring & Axle Co., Carthage, O., has increased its capital stock from $100,000 to $500,000.

The Robert Field Co., Cincinnati, has been organized with a capitalization of $10,000 by E. R. Carter, H. Black, J. S. Layne Jr., O. L. Lane and N. H. Ashley.

The Watertown Engine Co., Watertown, N. Y., has been organized to engage in the manufacture of engines, boilers and machinery. The incorporators are: J. C. Knowlton, N. P. Wardwell and G. C. Sherman.

The Interstate Engineering Co., Cleveland, has increased its capital stock from $500,000 to $1,500,000.

The Danville Car Co., Danville, Ill., has been incorporated with a capital of $250,000 by H. F. Vogel, N. Le Grand and J. A. Swanberg.

The Manitowoc Bronze & Brass Co., Manitowoc, Wis., has been organized with a capitalization of $25,000 by William J. Hess, A. L. Nash and W. L. Morris

The Hudson Electric Specialty Co., New York, will manufacture electric machinery and appliances. The authorized capital stock is $15,000, and the incorporators are: Wilfred A. Hennessy, 143 Liberty street; Walter G. Hocke, 5 East Forty-second street, and James J. Underwood, 128 Broadway, all of New York.

The Rockford Hand Vise Co., Rockford, Ill., has been incorporated with a capital stock of $5,000 by Frank Van Gauwenbergh, J. A. Holmes and H. P. Andrews.

The Willard Machine & Tool Co., Cincinnati, has been organized with a capitalization of $25,000 by George A. Willard, L. C. Willard, Perry C. Willard, W. L. Mersfielder and Aaron McNeill. This company recently occupied a new plant.

The Cyclone Woven Wire Fence Co., Cleveland, has been incorporated with a capital of $55,000 by C. J. and J. A. Lane, Ed. Bygorki, Edward W. Conrad and Marie E. Dendrix.

The Gadsden Car Works, Gadsden, Ala., recently acquired by the Alabama Great Southern railroad, has been incorporated and will be operated as a subsidiary organization of the latter company. The works will be increased from five to a 25-car daily capacity, and will be ready for operation by Jan. 1 for the manufacture and repairing of cars. The capital stock of the company is $50,000, and the incorporators are: W. J. Murphy, J. W. Hood, Charles Patton, W. A. Garrett, M. F. Mallory and A. Telford, all of Cincinnati.

The Wilkinson Steam Co., New York, has been organized to manufacture and sell turbines under license rights granted to it by the Wilkinson Turbine Co. of Alabama. The capital stock is $1,000,000, and the incorporators are. Joseph H. Hoadley, E. C. Ott, Henry W. King, New York; Edward K. Hill, Alfred H. Hoadley, Providence; J. M. Dewberry, James Wilkinson and Robert D. Johnston Jr., Birmingham.

The Commercial Cement Co., Ltd., Winnipeg, has been incorporated with $150,000 capital, the shares being held by many leading business men of the northwestern states. The principal promoter is Otto Babcock, who has spent the season investigating the different locations and deposits of raw material. The company has secured 640 acres on the Boyne river, about 70 miles southwest of Winnipeg, where a mill of over 1,000 barrels daily capacity will be erected

The Eureka Iron Works, New York, has been incorporated to construct buildings, iron works, etc. The capital stock is $20,000, and the incorporators are: William Diamond, 1622 Madison avenue; Henry Karges, 57 East 110th street, and Charles F. Doebler, 29 Broadway, all of New York.

The William Foster & Sons Co., Springfield, Ill., has been incorporated to manufacture sheet metal work. The capital stock is $15,000, and the incorporators are: William H. Foster, Eugene M. Foster and Harry Foster.

The Lima Gas Engine Co., Lima, O., has changed its name to the Lima Engine & Mfg. Co.

The Jencick Motor Mfg. Co. has been incorporated with a capital stock of $50,000 to manufacture motors, engines, etc. The incorporators are: George E. Mertz and Leander Norton, Rochester, N. Y., and Roger A. Young, Bronxville, N. Y.

The Racine Metal & Stamping Co., Racine, Wis., has been organized to conduct a manufacturing business in hardware specialties. The capital stock is $20,000, and the incorporators are: Jerome and Emily Ritter, Albert and Mary Falkenrath.

New Construction:—

The Straub Machinery Co., Cincinnati, incorporated a few weeks ago with $300,000 capitalization, has purchased a tract of four acres in Cumminsville, and early in the spring will begin the erection of a large foundry and machine shop.

The McCan Mechanical Works, Long Beach, Cal., is making extensive additions to its machine shop and other departments of its plant.

The Western Wheeler Scraper Co., Aurora, Ill., has begun work on a new building 80 x 128 feet.

The Frank H. Lamb Machine Co., Hoquiam, Wash., is to increase its foundry by a two-story structure 40 x 80 feet.

The James A. Spargo Wire Co., Rome, N. Y., has purchased a 12-acre tract upon which it will erect in the spring a large factory building 400 x 450 feet, of brick and steel construction.

The Gray Iron Foundry, Marion, Ind., is erecting a new office building.

Ground has been broken by the Rust Boiler Co., Pittsburg, for its new plant to be located at Midland, Pa. The first building to be erected will be a drum shop 107 x 420 feet, of steel construction. Plans are also being made for a structural shop, pipe shop and power plant.

The Skinner Chuck Co., New Britain, Conn., is just completing a power plant 44 x 71 feet. Concerning the property recently acquired adjacent to its plant, the company states that plans are not definite, but that it affords additional railroad frontage and will be held for future enlargements. The frame structure now on the site will be utilized for storage purposes.

The Canada Forge Co., Ltd., Welland, Ont., which was recently incorporated, will manufacture open-hearth steel forgings up to 10,000 pounds. Building operations are now under

way, and it is hoped to begin manufacturing by the first of the year. The two main buildings will be 50 x 125 feet each.

The Wheeling Can Co., Wheeling, W. Va., is increasing its plant by a new structure 72 x 186 feet.

The Bridgewater Machine Co., Akron, O., recently incorporated for the manufacture of dies and machinery, does not expect to build during the fall, but will probably take up this matter early in the coming year.

Work on the new buildings of the Camden Anchor-Rockland Machine Co., Rockland, Me., is progressing rapidly. The main building is 160 x 60 feet and the office building 60 x 40 feet.

The General Fireproofing Co., Youngstown, O., has let contracts for a 36 x 72-foot addition to its office building and an 85 x 200-foot addition to its general plant.

The Monarch Iron Works Co., Plymouth, Ind., recently incorporated with $50,000 capitalization, is to erect a foundry and machine plant.

Work has been begun on the car and locomotive shops of the Grand Trunk System at Battle Creek, Mich. The main machine shop is to be 200 x 818 feet. About a dozen buildings will be erected at a total cost of some $3,000,000.

The Chicago Pneumatic Tool Co., it is understood, is planning further additions to its plants, rendered necessary by the heavy volume of its business.

The Ashtabula Foundry Co., Ashtabula, O., is to increase its plant by the erection of a molding shop 84 x 130 feet. It will occupy the site of the company's warehouse, which is to be moved across the street.

The Empire Foundry Co., New Brunswick, N. J. is enlarging its plant by the addition of a brick building, two stories high, 142 feet long and 60 feet wide. The new portion will be used exclusively for the manufacture of gas stoves and appliances.

The Bullock electric plant of the Allis-Chalmers Co., located at Norwood, Cincinnati, it is authoritatively announced, is to be improved and given considerably larger capacity than at present.

The Orange Iron Works, Orange, Tex., states that improvements now contemplated include the early construction of a small foundry and probably during the early part of the year of car shops. Additional property adjoining its present plant was recently purchased.

The new foundry building of the W. Smith Grubber Co., La Crescent, Minn., is nearing completion.

Contracts have been let for the rebuilding of the works of the Shaw Crucible Steel Co., Hoquiam, Wash., which were destroyed by fire some weeks ago. Corrugated iron buildings will be erected and new furnaces installed.

The new plant of the Higgins Spring & Axle Co., Racine Junction, Wis., has been completed. It is of brick and steel construction entirely fireproof, and the factory contains 100,000 square feet of floor space. All machinery will be driven by independent motors.

Bids are being asked by the Thomas Construction Co., Niles, O., for the erection of a steel building 50 x 600 feet, with span 60 x 200 feet; also for two 50-ton open-hearth furnaces, two soaking pits and a blooming mill with seven continuous stands for the rolling of billets, sheet and tin bars.

The Florence & Cripple Creek Railroad Co., Canon City, Colo., announces that a new machine shop 60 x 126 feet, of steel construction, will be erected immediately to replace the building recently destroyed by fire. Only a portion of the machinery was destroyed. In addition to the necessary parts for the damaged machinery, the company, through its purchasing agent, A. L. Boyd, will be in the market for the following: 1,500 feet double-ply leather belting various widths; 110 feet 2 15-16-inch cold rolled shafting, with couplings and necessary pulleys; 10 22-inch drop hangers for same; one turret lathe; one engine lathe; one 35-inch blower; one shaper 22-inch stroke; one 40-inch drill press; one emery wheel stand; one planer 36 inches by nine feet; one valve facer; two air motors, and the nearly complete equipment of dies, taps, reamers, drills and hand tools.

The plant of the Malleable Iron Works, Terre Haute, Ind., is to be larger than was originally planned. Contracts have recently been let for one building and will be placed for another within a short time.

M. B. Farrin, Cincinnati, has taken out a permit for the erection of a small machine shop.

The Hamilton Foundry & Machine Co., Hamilton, O., has decided on additions to its plant which will practically double its capacity. A new foundry structure 60 x 386 feet will be erected and equipped with a five-ton and a 10-ton crane. Two sets of cupolas will be added and considerable new machinery which will be electrically operated. A power plant is now being erected.

The Mt. Vernon Bridge Co., Mt. Vernon, O., is preparing to enlarge its plant. As the company recently surrendered its charter, as the result of the action instituted by Attorney General Ellis, a new corporation is being formed to take over the works.

The Santa Fe Railroad Co. is soon to let contract for additional shops at Chanute, Kan., to cost about $175,000.

The Lattimer-Williams Co., Columbus, O., has prepared plans for a factory building 60 x 92 feet, and for a stove foundry 45 x 280 feet.

Ground has been broken for the blast furnace to be erected near Jackson, O., by the Jackson Iron & Steel Co. It is expected to have it in blast by next summer.

The boiler department of S. F. Bowser & Co., Ft. Wayne, Ind., is now occupying its new building. This is in the shape of an L, the larger wing being 80 x 180 feet and the smaller 60 x 60 feet.

The Foster Engineering Works, Newark, N. J., is making extensive alterations to its present plant to which a three-story structure is also being added.

Work has been started on the new plant of the Petroleum Iron Co., Masury, near Sharon, Pa., and it is expected to have the plant in operation by Feb. 1. The main building will be 300 x 600 feet.

The Republic Metalware Co., Buffalo N. Y., has completed an addition to its already large plant. A new galvanizing shop 80 x 80 feet, remarkably well equipped, is now ready for occupation.

General Industrial Notes:—

The Union Metal Post Co., Canton, O., recently incorporated, will manufacture a general line of porch columns, principally from sheet metal. Both the columns and machines for producing them are patented and the latter will be specially built. Requirements for standard lines of machinery will not be filled until the special machines are well under way.

The Queen City Punch & Shear Co., Cincinnati, has transferred the machinery, tools, patterns, etc., of the C. F. Heinss Machine Works, of New Richmond, O., to its shop at 208-212 Lawrence street, adjoining the Bollman-Wilson Foundry Co. Punching and shearing machinery and straightening and bending rolls will be manufactured and additional equipment will be required.

The Smith Falls Malleable Castings

Co., Montreal, Can., has purchased the plant of the Rideau Malleable Foundry Co.

Stocks in the yards of the American Pig Iron Storage Warrant Co., 44 Wall street, New York, during October declined from 8,300 tons to 3,900 tons. Deliveries were 4,900 tons and receipts only 500.

The Boynton Scale Co., Toledo, Ia., will be removed to Keokuk, Ia., in consideration of citizens of the latter place subscribing for $10,000 stock.

The E. L. Jones Co. has purchased the plant of the Buffalo Excelsior Machine Co., Buffalo, and will manufacture steel balls and casters. Two acres of land adjoining the plant have been purchased and extensive additions will be made.

The American Bridge Co., through its Ambridge plant, shipped a total of 21,500 tons of finished product during October, surpassing all records.

The Robb Engineering Co., Ltd., Amherst, N. S., has been consolidated with the Robb-Mumford Boiler Co., South Framingham, Mass., the former company becoming the owner of the stock of the latter. The two companies have been practically under the same management, D. W. Robb having been president of both. The new capitalization is $850,000.

The Elbridge Motor & Tool Co., Elbridge, N. Y., has taken over the De Long Motor Co., of Syracuse, which it recently purchased, with the plant which it formerly operated, under the name of the Elbridge Tool & Machine Co. The new company was recently incorporated with a capitalization of $25,000, and the officers are: R. B. Sweet, president and treasurer; W. L. Robedee, vice president, and G. E. De Long, secretary.

Fires:—

The Virginia Bridge & Iron Co., Roanoke, Va., states that its pecuniary loss by the recent fire which destroyed its girder shop at Burlington, N. C., was trivial, and that all delay in shipments occasioned thereby has now been overcome. The four shops at Burlington, which were not affected, have been in daily operation to their full capacity. The company is not in the market for new equipment by reason of the fire.

The Great Lakes Dredging Co., Port Arthur, Ont., sustained a considerable loss through the gutting of its machine shop, Oct. 25. Insurance is adequate.

The brass foundry of George W. Hayden, Cambridge, Mass., burned Oct. 26.

The Lorenna Fdy. Co., Bridgeport, Pa., recently lost its core building by fire.

The Co-operative Fdy. Co., Nashua, N. H., sustained a small loss by fire a few days ago.

Trade Notes:—

William Swindell & Bros., engineers and contractors of Pittsburg, have just completed the following contracts: Eight large Swindell regenerative heating furnaces for the Schoen Steel Wheel Co., McKees Rock, Pa.; one regenerative heating and one annealing furnace for the Singer Mfg. Co., Elizabethport, N. J.; one regenerative annealing furnace for the Lorain Steel Co., Johnstown, Pa.; one 30-pot crucible steel melting furnace for the Columbia Tool Steel Co., Chicago Heights, Ill.; one 40-ton melting furnace for the Farrel Foundry & Machine Co., Ansonia, Conn.; a malleable plant, including melting and annealing furnaces, for the Amherst Malleable Iron Co., Amherst, N. S.; two Swindell annealing furnaces for the Superior Steel Co., Carnegie, Pa.; a gas producer plant for the Crucible Steel Co. of America, Spaulding-Jennings Works, Jersey City, and the entire furnace equipment of the Firth-Sterling Steel Co., Uniontown, D. C., including open-hearth, melting furnace, regenerative heating furnaces, annealers, treating furnaces and gas plant. The same firm is about to commence work on the following contracts, all material for which has been purchased and delivered: Two 25-ton basic open-hearth furnaces and one regenerative heating furnace for the West Leechburg Steel Co., West Leechburg, Pa., one 10-ton open-hearth furnace for the Fort Pitt Malleable Co., McKees Rocks, Pa.; one 20-ton open-hearth furnace with gas producers for the Crucible Steel Co. of America, Harrison, N. J.; two 30-pot crucible steel melting furnaces and gas plant for the Ludlum Steel & Spring Co., Watervliet, N. Y., and an extension to the gas producer plant of the Alan Wood Iron & Steel Co., Ivy Rock, Pa.

The Maryland Steel Co., Sparrows Point, Md., has closed with the Baltimore Steel Packet Co. for a new passenger steamer about 306 feet over all.

The ore-handling machinery for the 500-ton blast furnace to be erected by the New York State Steel Co., Buffalo, will be supplied by the Brown Hoisting Machinery Co., Cleveland. A number of other contracts have been let. The two 200-ton Talbot furnaces will be ready for operation early in the new year.

The Canton Pump Co., Canton, O., reports a heavy trade in its automatic feed pump and receiver, especially for brick and cement plants, lumber mills, factories, hotels, etc.

Contract has been placed by the Buffalo & Susquehanna Iron Co., Buffalo, with the Brown Hoisting Machinery Co., Cleveland, for two Brown bridges, to have a span of 223 feet, and each to have an unloading capacity of 300 tons an hour. The company has practically finished ore shipments for the season. The new bridges will be put in operation for 1907.

TRADE PUBLICATIONS.

The Gleason Works, Rochester, has just published one of the handsomest catalogs which has ever appeared illustrating gear planers. The cover is of pure white steam rolled stock tied with a gold net ribbon and set with a gold seal. The title is embossed. The title and forward pages are printed on brilliant white enameled book paper. These pages contain descriptions in detail of the machines. Following these are about 50 pages devoted exclusively to half tone cuts which are in the form of inserts. These pages are of white rolled stock with the titles printed in gold ink. An olive green border is done around each illustration. Between each illustration is a cover of ribbon embossed transparent parchment with the Gleason trade mark emblem printed in olive green ink, giving a water mark effect. The illustrations are all from retouched photographs, and show the complete line of Gleason gear planers, including the new automatic bevel gear machine. The book is a magnificent specimen of the printers' art and far finer than is usually seen in the machine tool trade.

Graphite as a Lubricant.—The Joseph Dixon Crucible Co., Jersey City, is distributing the tenth edition of "Graphite as a Lubricant." The numerous good features of the previous editions have been retained, and this one contains considerable new information, scientific and practical on the subject, making it valuable to both engineer and workman.

The American Ship Building Co. has taken formal possession of the Ship Owners' Dry Dock Co., of Chicago, which recently figured in the deal closed by the Lackawanna Steamship Co. with the ship building company for eight steel freighters.